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INITIAL CRUISE REPORT

CHAIN 115, LEG 6

By

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TECHNICAL REPORT

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Approved for Distribution Carl Bowin

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TABLE OF CONTENTS

INTRODUCTION

Leg 6 of CHAIN Cruise 115 began in Rio de Janeiro on 22 April 1974, and terminated in Recife on 18 May 1974. A multi-disciplinary scientific program was carried out within the Vema Channel and on the northern flanks of the Rio Grande Rise (see Figure 1). Personnel and scientific programs representing several institutions (W.H.O.I., Scripps, Lamont-Doherty) were included in the project; Brazilian observers representing PETROBRAS and the National Research Council also participated in the program.

Geological, geophysical, and physical oceanographic data were obtained in view of the following principal objectives:

I. Paleo-oceanography: Establishment of intensity of bottom current flow through Vema Channel during the Pleistocene.

Recent work in the central Pacific (Johnson, 1972) and the circum-Antarctic region (Watkins and Kennett, 1971), suggests that the abyssal circulation has experienced major pulsations during the Pleistocene, probably in response to the extreme fluctuations in climate associated with glacial-interglacial conditions. The depositional record indicates that bottom currents were significantly stronger during glacial stages than they are at present. These hypotheses were further tested on Leg 6 in the southwestern Atlantic, where the Rio Grande Rise exists as a major topographic barrier in the path of the northward-flowing Antarctic Bottom Water (Le Pichon et al, 1971). At least one major gap, The Vema Channel, cuts through the rise and provides a 4700-meter-deep passage for the Antarctic Bottom Water between the Argentine Basin and the Brazil Basin (see Figure 1).

During Leg 6 of CHAIN cruise 115, coring and bottom water temperature measurements were carried out on the east flank of the Vema Channel in order to supplement the core data obtained by scientists from Center Oceanologique de Bretagne during an expedition of CHARCOT in October-November of 1973. Interpretation of the Pleistocene record in these Vema Channel cores will be a joint effort of W.H.O.I. and C.O.B. paleontologists.

II. Paleomagnetics: Extension of magnetic time scale into the middle Tertiary, and correlation of magnetics with established biostratigraphic zones and "absolute" ages.

Relatively few long sediment cores have been obtained which represent the magnetic epochs prior to the Gilbert, of early Pliocene age. A major effort is needed to extend the magnetic time scale downward into the middle Tertiary, and to correlate the magnetic stratigraphy with recognized biostratigraphic zones and absolute ages. The Rio Grand Rise affords an excellent opportunity for obtaining cores which may satisfy this objective. The rise is located in a sufficiently high latitude such that reversals in magnetic inclination are readily detectable in the cores. There is a thick accumulation of biogenous pelagic sediment on the rise, containing well-preserved microfossil assemblages. Moreover, the sediment distribution pattern on the rise is highly irregular, and there appear to be numerous areas on the flanks of the rise where deeper reflectors are outcropping. In these areas, cores can be obtained in older sediments, avoiding the overburden of upper Cenozoic sediments in which the magnetic time scale is relatively well established.

III. Suspended matter in near-bottom water of Vema Channel.

From existing nephelometer data, the Vema Channel is known to be a significant conduit for suspended matter transported northward in the AABW (Ewing et al, 1971). The cold and turbid AABW here is separated by a strong thermocline from the relatively clear overlying North Atlantic Deep Water. The top of the nepheloid layer corresponds approximately to the height of the channel walls. Suspended matter concentrations near bottom are on the order of 100 µg/L. Up to the present, only "spot" measurements have been made in the channel, with no detailed studies in time or space. The purpose of the nephelometer measurements on Leg 6 was to examine some of these details. Two kinds of instruments were used: one is a free fall long-term recording nephelometer to record time variations in turbidity near the bottom in the axis of the channel. The second is the standard vertical profiling nephelometer.

IV. Abyssal circulation and transport of bottom water through Vema Channel

The deep and bottom waters of the southwestern Atlantic are constrained both vertically and horizontally by the Rio Grande Rise. Because these flows are funneled here, the resulting higher-velocity flows may be measured best over and through the deepest western passage, the Vema Channel. The data from CHAIN 115, Leg 6 will be combined with the hydrographic and current meter data of Reid et al, (1973), gathered during the fall of 1972 (CATO expedition, R/V MELVILLE), to yield estimates of the intensity of deep and bottom water flow through the Channel and an understanding of the general circulation in the region of the Rise.

V. Heat flow and bottom water temperature profiles.

Geothermal measurements on and near the Rio Grande Rise were obtained for two purposes: (1) to deduce the tectonic history of the Rise, and (2) to study the dynamics of deep water motion. The magnitude of heat flow on the Rise should help to determine if the crustal structure has continental affinities, or whether the Rise is a large basaltic rock pile. In the former case, the heat flow may be higher due to the excess heat production of more sialic rocks. The oscillation of a boundary between deep water masses of different temperature may cause a variable temperature to be impressed at the sea floor. Vertical water temperature profiles obtained with lowering of the heat-flow apparatus will define the present position of the upper boundary of Antarctic Bottom Water, and temperature gradient measurements in the sediments at similar depths may help to define oscillations of the boundary during the past.

ACKNOWLEDGEMENTS

Financial support for shipboard operations and most of the scientific programs during Leg 6 of CHAIN Cruise 115 was provided under National Science Foundation grant GA-41185. Seismic profiling and bathymetry were supported under O.N.R. Contract N00014-66-C-0241. Bottom current measurements received support under N.S.F. Grant No. GA-41285 to W. Patzert and to J.L. Reid (Scripps). Support for the Lamont-Doherty nephelometer program was provided under O.N.R. Contract N00014-67-A-0108-0004 and N.S.F. Grant GA-27281. Supplementary equipment items required for the transponder navigation system were provided by the Woods Hole Ocean Industry Program.

Numerous individuals and institutions provided access to unpublished data which proved helpful in planning the shipboard operations. Mr. John Ewing provided copies of seismic reflection profiles obtained previously by expeditions of the Lamont-Doherty Geological Observatory in the Vema Channel-Rio Grande Rise area. Mrs. Dorothy Cooke and Dr. Lloyd Burkle provided descriptive and biostratigraphic information on the extensive collection of cores obtained on the Rio Grand Rise by Lamont-Doherty. Mr. Thomas E. Chase furnished copies of navigation, bathymetry, and seismic profiling data obtained by Scripps' R/V MELVILLE during CATO Expedition, Leg 6 (1972). Dr. Vincent Renard and Dr. Marthe Melguen of Centre Oceanologique de Bretagne (Brest, France) allowed us to examine unpublished seismic profiles and core data obtained by the CHARCOT during their expedition to the South Atlantic in late 1973.

The assistance of the many individuals who assisted in cruise preparation is gratefully acknowledged. Special thanks are due to Dr. E.T. Bunce for help in planning the logistics of the cruise; to Ed Laine for assisting with the interpretation of data from previous cruises and selection of detailed survey sites; to William Powell (Scripps) for the preparation of the transponder navigation system prior to the cruise and for its successful operation at sea; to Mr. Joseph L. Reid and Dr. William Patzert (Scripps) for providing bottom current meters; and to Dr. Steve Eittreim (Lamont-Doherty) for making the L.D.G.O. nephelometers available.

Finally, I thank the officers and crew of R/V CHAIN and the members of the scientific party on Leg 6 for their dedicated work at sea under difficult weather conditions; the success of the scientific program is in large measure a result of their support and cooperation.

Cruise Personnel, Leg 6

Dr. David A. Johnson	W.H.O.I.
Dr. Elizabeth T. Bunce	"
Mr. Alan Driscoll	"
Mr. Warren Witzell	"
Mr. Edward Laine	"
Mr. John Connell	"
Dr. Charles Denham	"
Dr. G. Patrick Lohmann	"
Mr. Edward Scheer	"
Mr. Keith von der Heydt	"
Dr. Henri Berteaux	"
Miss Helen Hays	"
Mr. Thomas O'Brien	"
Mr. A.L. Peirson	"
Mr. Larry Sullivan	Lamont-Doherty
Mr. William Powell	Scripps
Mr. Dennis Edwards	W.H.O.I.
Mr. David Twichell	"
Mr. Scott McDowell	"
Mr. Mark Flora	"
Mr. Waltir Guazelli	PETROBRAS
Mr. Abilio Bittencourt	Nat'l. Res. Council (Brazil)

UNDERWAY OBSERVATIONS

The track of R/V CHAIN on Leg 6 is shown on Figure 1. More detailed navigation plots are presented in Appendix II of this report, and a listing of the fixes used for navigational control is included as Appendix III.

Echo-sounding and gravity observations were obtained continuously during Leg 6. The ship's 3.5 kHz transducer was used for echo sounding, with a pulse length of 1 millisecond. Data were recorded on a Precision Graphic Recorder, and digitized at intervals of five minutes and at all breaks in slope. A proton-precession magnetometer was towed approximately 600 feet behind the ship for recording the earth's magnetic field. Magnetic observations were obtained continuously during Leg 6, except when the ship was within 200 miles of Brazilian territory.

Continuous seismic reflection profiles were obtained during most of the steaming and surveying operations in the Vema Channel area and on the Rio Grande Rise, during the period of 23 April until 12 May. Two 40 cubic inch air guns, fired simultaneously at a 10-second repetition rate, were used as a sound source; received signals were summed for 2 towed hydrophone arrays and recorded on each of 4 recorders operating at sweep rates of 2 1/2, 5, 7 1/2, and 10 seconds. Data were obtained only when the ship was underway between stations for periods longer than 6 hours.

Persons interested in obtaining information about any of the underway geophysical data should contact directly the appropriate person indicated in Appendix I of this report.

STATION DATA

1. Bottom current measurements (see Table 1)

Five current meters, of the type developed by Scripps' Marine Life Research Group (Schick et al, 1968), were deployed to obtain measurements of deep and bottom water flow in the vicinity of the Vema Channel. Current meters #1 and #2 were positioned 1000 meters above the sea floor within the North Atlantic Deep Water; measurements of the flow of NADW at these stations will supplement the data obtained previously by Reid et al, (1973) for the regional deep circulation of the Southwestern Atlantic. Current meters #3 and #4 were positioned close to the sea floor in the western branch of the Vema Channel (see Figure 2). Bathymetric data on the Vema Channel (Lonardi and Ewing, 1971) has indicated that this western channel has a sill depth only slightly shallower than the main branch of the channel, and that a substantial transport of AABW may be present within the western branch. Current meters #3 and #4 were located in the axis of the western branch to test this hypothesis. Current meter # 5 was positioned near GEOSECS Station 59 in the main exit of the channel, in an attempt to record the northward-flowing AABW at a location where relatively strong flow was anticipated.

All instruments recorded current speed and direction for the entire period of their deployment. A malfunction of current meter #2 was suspected during its launching, and a back-up instrument (current meter #3) was deployed at the same location to insure a reliable current record at this site. Upon recovery of current meter #2, we learned that it had functioned satisfactorily, and thus duplicate bottom current observations were obtained at this location.

2. Bottom water temperature profiles (see Table 2)

Thermistors were mounted on the core barrel for obtaining data on the thermal structure of the bottom water at several of the coring sites in the Vema Channel and on the Rio Grande Rise. Data were telemetered acoustically to the ship and recorded on a Precision Graphic Recorder. Successful profiles of bottom water temperature were obtained at seventeen of the coring stations.

3. Heat flow stations (see Table 3)

Sufficient core penetration was obtained at eleven of the coring stations to allow a reliable heat flow measurement to be obtained. Data of questionable reliability were obtained at four additional coring sites. Because of the coarse texture and degree of lithification of the calcareous sediments encountered, the thermistor probes were damaged or lost on numerous coring stations.

4. Cores (see Table 4)

Thirty-two successful cores were obtained on Leg 6. Of these, one was in the axis of the western branch of the Vema Channel, eight were along the eastern flank of the channel in depths ranging from 2941 meters to 4310 meters (see Figure 2), and the remaining twenty-three were within a small area on the north flank of the Rio Grande Rise (see Figure 3).

The eight cores from the eastern side of the Vema Channel will complement a set of cores recently obtained along the same profile by C.O.B. scientists. We will be examining the faunal dissolution patterns and faunal biogeography in Pleistocene sediments along this profile, in an attempt to determine the history of Antarctic Bottom Water flow through the Vema Channel during the Pleistocene.

Coring on the north flank of the Rio Grande Rise was undertaken with the objective of obtaining a continuous Tertiary stratigraphic section for paleomagnetic/biostratigraphic correlations. Based on extensive seismic profiling coverage in the vicinity of DSDP Site 22 by Lamont-Doherty's VEMA, Cruise 26, we selected possible coring sites where Lamont's seismic profiles and 3.5 kHz profiles indicated that deep reflectors may be outcropping. After an initial core (Station 108, Core 64) in the area recovered Middle Miocene sediments, acoustic transponders were deployed for navigational control during the remainder of the coring operations.

By examining each core at 150-cm intervals immediately after the core was obtained, we were able to determine the biostratigraphic age and degree of continuity within each core. Our original objective was to obtain cores which were as old as possible by working our way downslope and stratigraphically down-section. However, we found that the Eocene and Oligocene

sediments on the lower slopes (cores 70 and 82) were sufficiently lithified to cause bending of the core barrels or poor core penetration. Consequently, we attempted most of the cores near the crest and upper slopes of a prominent ridge (see Figure 3) where we were able to consistently obtain full core penetration into Miocene and Pliocene sediments.

Table 4 indicates that ten cores of Miocene/Pliocene age, totalling approximately 70 meters of sediment, were obtained in the area of study. We believe there is an excellent chance of stratigraphic continuity for a substantial portion of the Miocene/Pliocene within these cores.

5. Nephelometer stations (see Table 5)

A conventional wire-lowered nephelometer and a free-vehicle nephelometer were used for estimating concentrations of suspended matter in the near-bottom water. The free-vehicle nephelometer was deployed in the axis of the Vema Channel at the location of Current Meter #5 and GEOSECS Station 59. It recorded continuously for 11 days of its operation. Conventional nephelometer profiles were obtained at a total of fifteen stations in the western and main branches of the Vema Channel, on the east flank of the channel, and on the north flank of the Rio Grande Rise in the area of closely-spaced cores.

6. Camera stations (see Table 6)

Sea floor photographs were obtained at three coring stations, using a camera and strobe which were housed in the coring weight stand, (see McCoy & Von Herzen, 1971 for a description of the apparatus). Four additional camera stations were made, using a "pogo" camera which is activated by a tripping mechanism suspended below the camera.

7. Hydrographic stations (see Table 7)

Two hydrographic stations (#114 and #135) were taken within the axis of major canyons which trend northward from the area of closely-spaced cores on the north flank of the Rio Grande Rise. Four stations (#142, 145, 147, 148) were taken in a profile across the axis of the Vema Channel near the location of Current Meter #5 (see Figure 2). A final hydrographic station (#150) was taken in the western branch of the Vema Channel near Current Meters #2,3 and 4.

SUMMARY OF PRINCIPAL RESULTS

1. Strong northward transport of Antarctic Bottom Water was confirmed by current meter observations in the western branch of the Vema Channel. Nephelomter, hydrographic, and temperature probe data at the same location support this interpretation.

2. A profile of hydrographic stations across the axis of the Vema Channel (near 30°13'S) allows an estimation of the northward transport of AABW through the main axis of the channel.

3. Long-period current meter records and nephelometer observations were obtained within the axis of the Vema Channel in order to correlate the transport of suspended matter with the flow intensity.

4. A profile of eight cores was obtained on the eastern flank of the Vema Channel, between a depth of 2941 meters and 4310 meters. The dissolution patterns and paleobiogeographic information in the faunal assemblages will be used to interpret the history of the Antarctic Bottom Water flow through the Vema Channel during the Pleistocene.

5. Ten cores totalling approximately 70 meters of sediment were obtained in Miocene/Pliocene sediments on the crest of the Rio Grande Rise. Microfossil preservation in these cores is excellent, and the lithology of the cores is suitable for paleomagnetic measurements. A detailed correlation of paleomagnetic and biostratigraphic events will be established for this core material.

6. Several major erosional channels on the north flank of the Rio Grande Rise were investigated as possible conduits through which eroded sediment from the crest of the rise is or was transported into the Brazil basin.

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FIGURE CAPTIONS

Figure 1. Cruise track of CHAIN 115, Leg 6. Bathymetric contours in corrected meters. Detailed bathymetry of work areas in Vema Channel and on Rio Grande Rise is shown in Figures 2 and 3.

Figure 2. Bathymetry of Vema Channel, after Lonardi and Ewing (1971). Contours are in uncorrected fathoms. Locations of current meters, cores, and profile of hydrographic stations are shown.

Figure 3. Bathymetry of area of closely-spaced cores on northern flank of Rio Grande Rise. Contours in uncorrected fathoms. Locations of acoustic transponders and cores are shown.

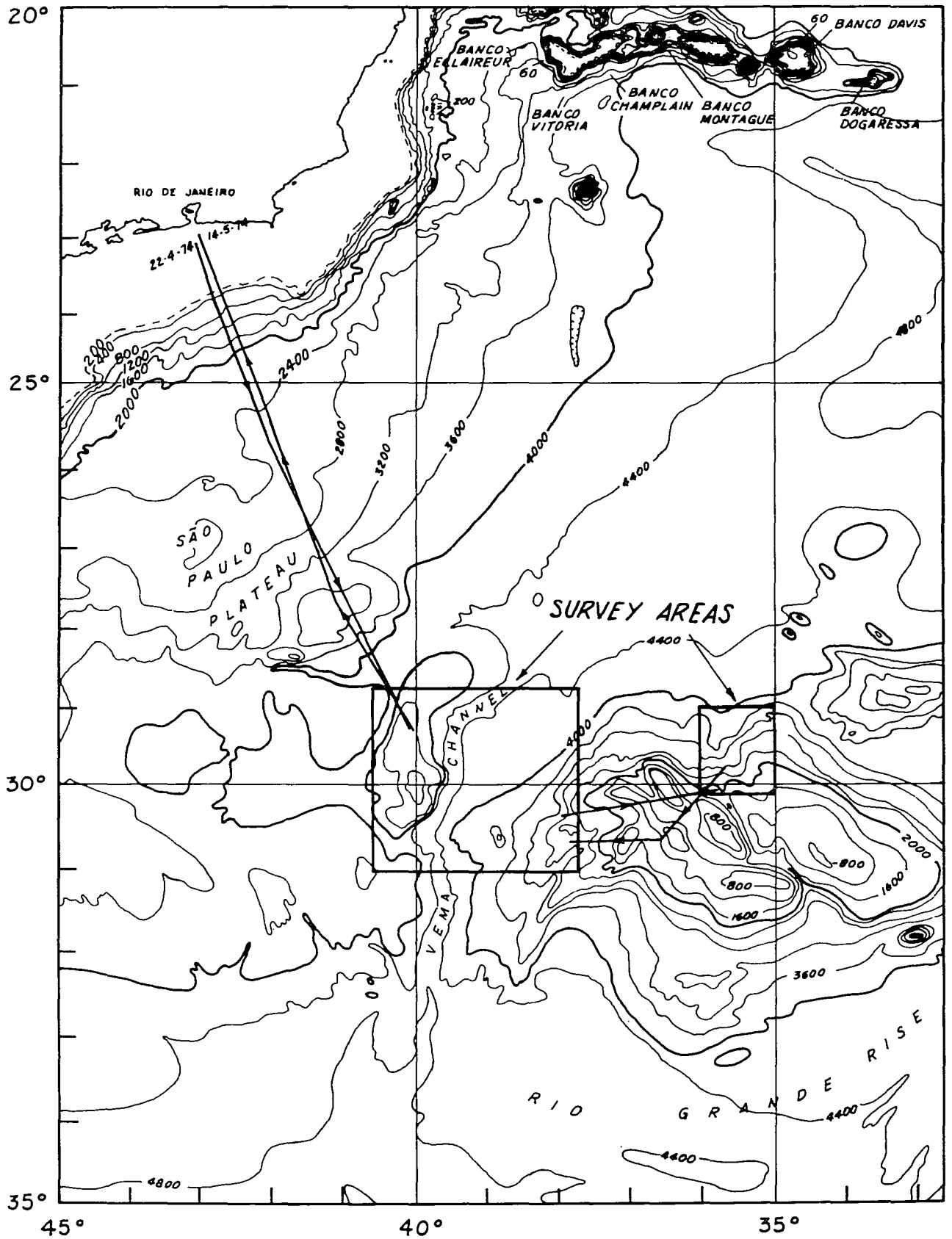

20°
25°
30°
35°
45°
40°
35°
BANCO DAVIS
BANCO ECLAIREUR
BANCO VITORIA
BANCO CHAMPLAIN
BANCO MONTAGUE
BANCO DOGARESSA
RIO DE JANEIRO
22-4-74
14-5-74
SÃO PAULO PLATEAU
SURVEY AREAS
VEMA CHANNEL
RIO GRANDE RISE
200
800
1200
1600
2000
2400
2800
3200
3600
4000
4400
4800

Figure 1

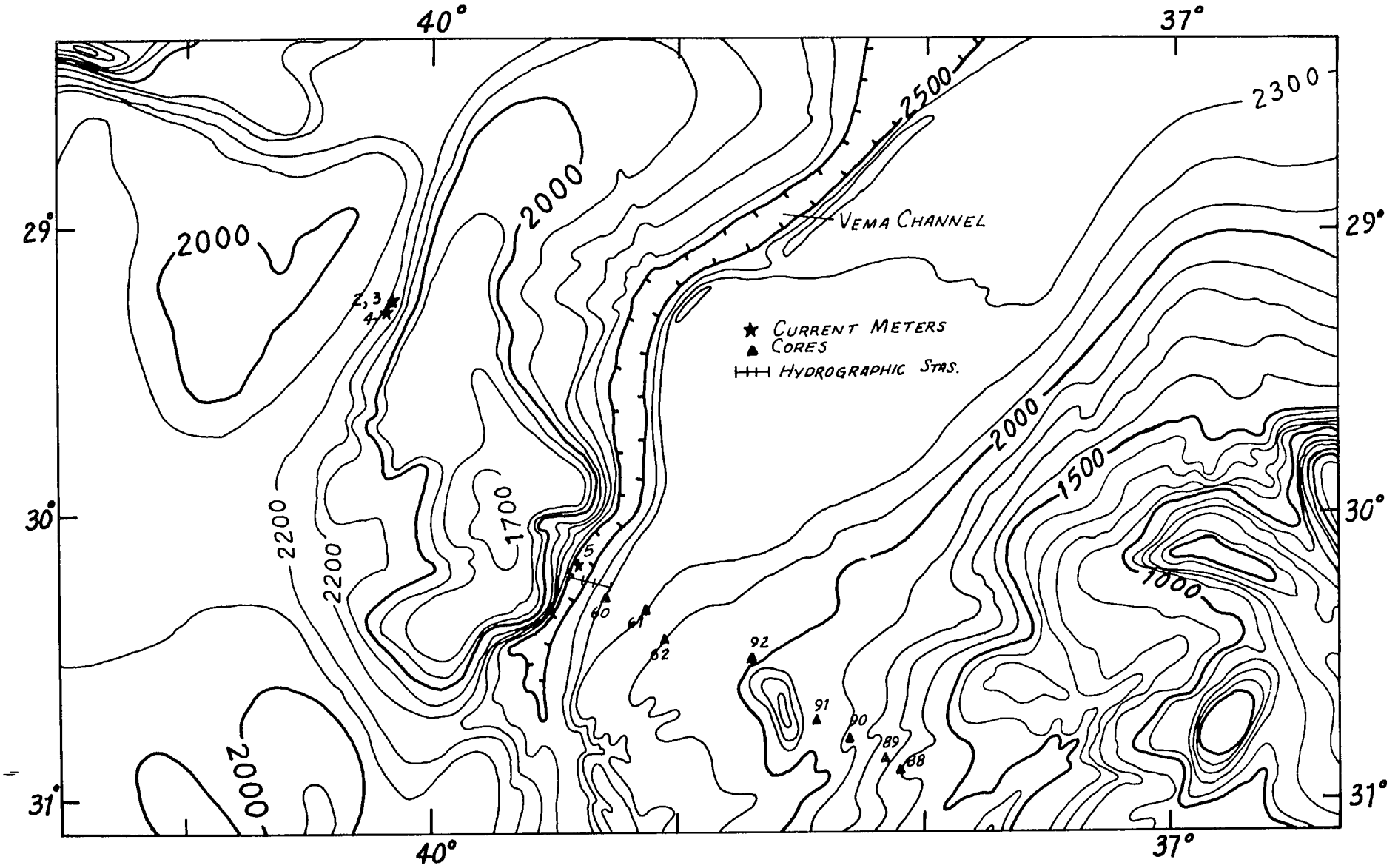
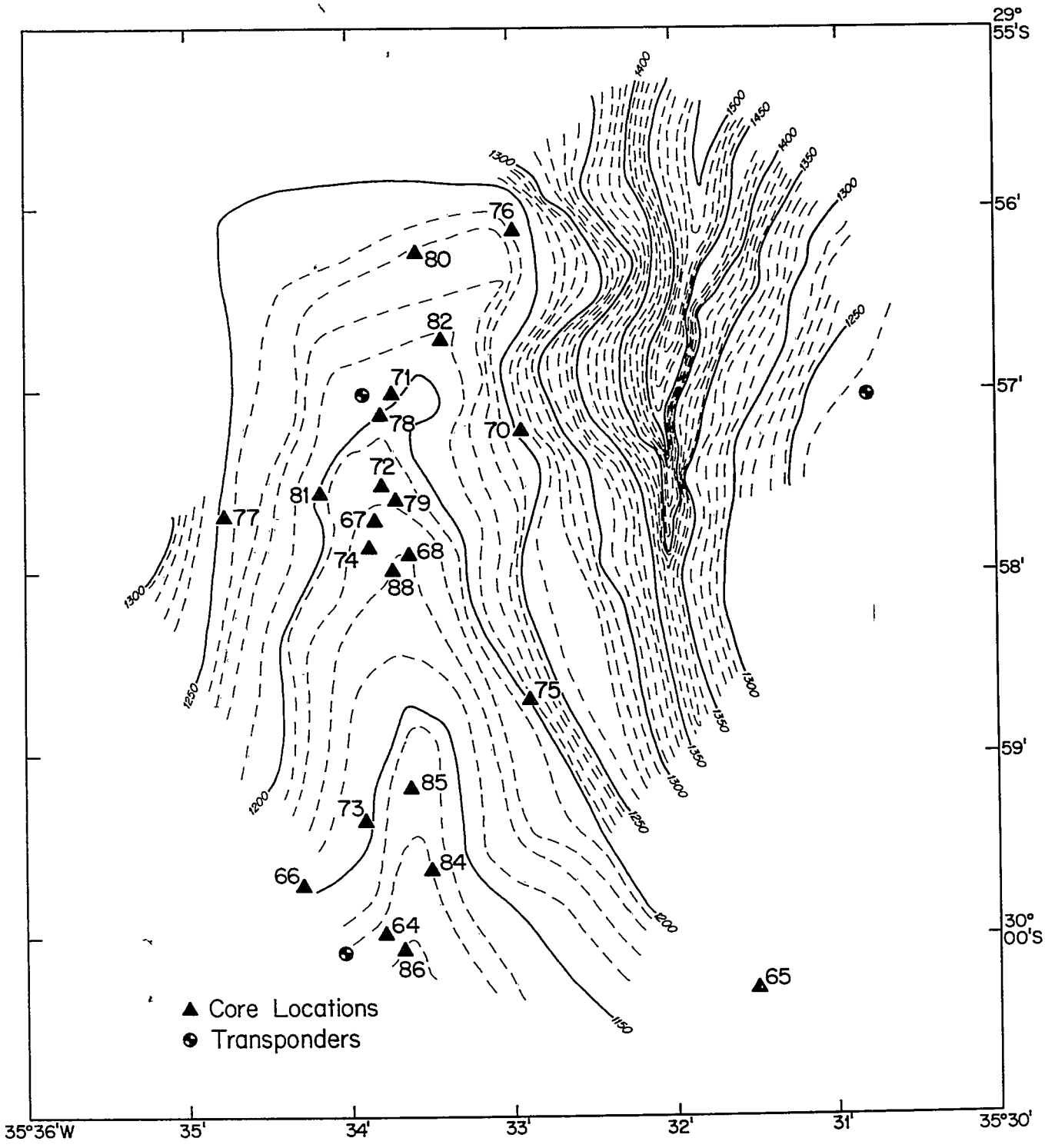

40°
37°
29°
30°
31°
2500
2300
2000
1500
1000
1700
2200
VEMA CHANNEL
CURRENT METERS
CORES
HYDROGRAPHIC STAS.
2, 3
4
5
60
61
62
92
91
90
89
88

Figure 2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55'S
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00'S
35°36'W
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34'
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35°30'
76
80
82
71
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81
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74
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64
86
65
1400
1500
1450
1400
1350
1300
1250
1300
1350
1300
1250
1200
1150
1300
1250
1200
▲ Core Locations
● Transponders

Figure 3

TABULATION OF STATION DATA

TABLE 1. BOTTOM CURRENT METER STATIONS

Current Meter	Latitude	Longitude	Water Depth (m)	Height above bottom	Start Time	End Time
1	27°49'S	40°49'W	2907	1000 m	1123/Apr 23	0425/May 13
2	29°20'S	40°05'W	4188	1000 m	1104/Apr 24	1600/May 12
3	29°20'S	40°05'W	4204	10 m	1045/Apr 24	1448/May 12
4	20°22'S	40°07'W	4172	10 m	2044/Apr 24	1446/May 12
5	30°11'S	39°23'W	4819	10 m	1053/Apr 25	1445/May 11

TABLE 2. BOTTOM WATER TEMPERATURE PROFILES

Station No.	Time, Date	Latitude	Longitude	Depth (m)	Bottom Water Temperature (°C)
102	2230/Apr 24	29°20.8'S	40°05.8'W	4188	<0.85
104	0732/Apr 26	30°14.1'S	39°14.6'W	4310	0.087
105	1415/Apr 26	30°14.2'S	39°12.4'W	4181	0.989
106	2105/Apr 26	30°24.6'S	38°58.4'W	4065	1.200
107	1755/Apr 27	30°26.7'S	38°48.8'W	3905	*
108	1605/Apr 29	30°00.2'S	35°34.7'W	2125	2.771
109	2203/Apr 29	30°00.3'S	35°31.5'W	2343	2.776
111	1630/Apr 30	29°57.8'S	35°34.0'W	1882	2.781
112	2006/Apr 30	29°57.9'S	35°33.6'W	2255	2.770
113	1610/May 01	29°57.7'S	35°34.2'W	2360	*
115	2300/May 02	29°57.2'S	35°32.9'W	2272	2.740
116	0405/May 03	29°56.5'S	35°34.1'W	2242	2.781
126	1744/May 05	29°57.7'S	35°34.0'W	2270	2.784
127	0040/May 05	29°55.4'S	35°32.4'W	2258	2.775
137	1148/May 09	30°55.0'S	38°04.8'W	2941	2.30
139	1709/May 09	30°53.1'S	38°12.1'W	3152	2.626
141	0213/May 10	30°50.0'S	38°26.8'W	3576	1.933
144	2024/May 10	30°26.5'S	38°50.0'W	3934	1.533
150	2057/May 12	29°21.3'S	40°03.7'W	4193	0.136

* Core pre-tripped. No bottom temperature obtained.

TABLE 3. HEAT FLOW STATIONS

Station No.	Core No.	Latitude	Longitude	Data Quality
102	58	29°20.8'S	40°05.8'W	poor
104	60	30°14.1'S	39°14.6'W	good
105	61	30°14.2'S	39°12.4'W	good
106	62	30°24.6'S	38°58.4'W	good
107	63	30°26.7'S	38°48.8'W	*
108	64	30°00.2'S	35°34.7'W	good
109	65	30°00.3'S	35°31.5'W	no sed.thermistors use
111	67	29°57.8'S	35°34.0'W	good
112	68	29°57.9'S	35°33.6'W	poor
113	69	29°57.7'S	35°34.2'W	*
115	70	29°57.2'S	35°32.9'W	poor
116	71	29°56.5'S	35°34.1'W	good
126	81	29°57.7'S	35°34.0'W	poor
127	82	29°55.4'S	35°32.4'W	good
137	88	30°55.0'S	38°04.8'W	good
139	89	30°53.1'S	38°12.1'W	good
141	91	30°50.0'S	38°26.8'W	good
144	92	30°26.5'S	38°50.0'W	fair

* Core pre-tripped. No data obtained.

TABLE 4. LIST OF CORES

Station No.	Core No.	Latitude	Longitude	Depth (m)	Length of Core (m)	Age
102	59	29°20.8'S	40°05.8'W	4188	7.53	Pleistocene (?)
104	60	30°13.8'S	39°14.6'W	4310	5.47	Pleistocene
105	61	30°15.5'S	39°05.8'W	4181	8.19	Pleistocene
106	62	30°24.6'S	38°58.4'W	4065	6.97	Pleistocene
107	63	30°27.0'S	38°49.1'W	3847	**	---
108	64	30°00.0'S	35°33.8'W	2029	8.97	Late Miocene
109	65	30°00.3'S	35°31.5'W	2343	5.40	Pleistocene
110	66	30°00.0'S	35°34.6'W	2053	3.30	Pleistocene
111	67	29°57.8'S	35°34.0'W	2189	7.40	Late Miocene
112	68	29°57.0'S	35°34.0'W	2255	1.98	Pleistocene
113	69	29°56.4'S	35°33.5'W	2315	**	---
115	70	29°55.2'S	35°39.3'W	2272	5.55	Latest Eocene
116	71	29°56.7'S	35°34.1'W	2242	5.45	Pleistocene
117	72	29°57.6'S	35°32.9'W	2275	5.24	Pleistocene
118	73	29°58.8'S	35°34.0'W	2138	7.19	Late Miocene
119	74	29°57.8'S	35°32.4'W	2190	7.36	Pleistocene
120	75	29°58.4'S	35°32.9'W	2222	6.78	Late Miocene
121	76	29°56.1'S	35°33.0'W	2315	6.87	Late Miocene
122	77	29°56.9'S	35°36.4'W	2330	4.53	Pleistocene

(cont'd.)

TABLE 4 (cont'd.) LIST OF CORES

Station No.	Core No.	Latitude	Longitude	Depth (m)	Length of Core (m)	Age
123	78	29°57.0'S	35°32.5'W	2233	7.56	Pleistocene
124	79	29°57.6'S	35°33.7'W	2214	7.04	Late Miocene
125	80	29°55.4'S	35°32.4'W	2293	4.66	Early Miocene
126	81	29°57.5'S	35°34.7'W	2270	2.69	Late Miocene
127	82	29°56.9'S	35°32.8'W	2259	5.00	Latest Oligocene
128	83	29°58.5'S	35°32.4'W	2189	6.51	Pleistocene
129	84	29°59.6'S	35°34.5'W	2110	6.67	Pliocene
130	85	20°59.0'S	35°33.5'W	2115	7.40	Pleistocene
131	86	29°59.7'S	35°34.3'W	2112	6.90	Late Miocene
134	87	29°46.3'S	35°36.0'W	3302	0.05	(unfossiliferous)
137	88	30°55.0'S	38°04.8'W	2941	7.04	Pleistocene
139	89	30°52.8'S	38°11.8'W	3152	6.72	Pleistocene
140	90	30°51.0'S	38°22.3'W	3384	6.54	Pleistocene
141	91	30°49.5'S	38°25.8'W	3576	9.18	Pleistocene
144	92	30°25.8'S	38°50.0'W	3934	7.34	Pleistocene

** Core pre-tripped

TABLE 5. NEPHELOMETER STATIONS

Station No.	Nephelometer Obs. No.	Time, date	Latitude	Longitude	Depth (m)	Quality of Data
103	1	0225/Apr 25	30°11.6'S	39°27.1'W	4821	good
104	2	1025/Apr 26	30°13.0'S	39°16.2'W	4312	good
105	3	1644/Apr 26	30°15.4'S	39°02.1'W	4151	good-excellent
107	4	2010/Apr 27	30°25.8'S	38°47.9'W	3913	good-excellent
108	5	1325/Apr 29	29°59.0'S	35°33.6'W	2387	good-excellent
114	6	2239/May 01	29°56.4'S	35°31.7'W	2750	good-excellent
135	7	0044/May 08	29°47.1'S	35°34.2'W	3317	good-excellent
138	8	1419/May 09	30°52.4'S	38°13.0'W	3164	good-excellent
140	9	2315/May 09	30°52.1'S	38°24.1'W	3405	good-excellent
142	10	1020/May 10	30°13.8'S	39°15.4'W	4308	good-excellent
144	11	2250/May 10	30°27.1'S	38°51.0'W	3972	good-excellent
145	12	0440/May 11	30°12.9'S	39°17.8'W	4596	good-excellent
147	13	1510/May 11	30°12.8'S	39°23.9'W	4825	good-excellent
148	14	2100/May 11	30°12.4'S	39°18.3'W	4671	good-excellent
150	15	2200/May 12	29°20.9'S	40°03.7'W	4193	good-excellent

Free-fall Nephelometer Station: 30°10.9'S 39°23.6'W

Duration of Record: 0210/Apr 26 - 1947/May 11

TABLE 6. CAMERA STATIONS

Station No.	Type*	Latitude	Longitude	Depth (m)	No. of exposures
122	C	29°57.0'S	35°36.9'W	2330	30
127	C	29°57.0'S	35°33.0'W	2259	30
128	C	29°58.5'S	35°32.4'W	2189	20
132	P	29°58.0'S	35°33.9'W	2549	7
133	P	30°00.1'S	35°34.6'W	2125	6
136	P	29°43.0'S	35°33.1'W	3430	30
143	P	30°16.0'S	39°10.0'W	4188	6
144	C	30°26.5'S	38°50.0'W	3034	0
149	P	30°12.8'S	39°20.9'W	4758	4

* C = core head camera; P = pogo camera

TABLE 7. HYDROGRAPHIC STATIONS

Station No.	Hydrocast No.	Latitude	Longitude	Depth (m)	No. of Bottles	Depth Range of Observations
114	1347	29°56.4'S	35°31.7'W	2751	20	1350 m to bottom
135	1348	29°47.1'S	35°34.2'W	3293	20	2000 m to bottom
142	1349	30°13.8'S	39°15.4'W	4310	20	3200 m to bottom
145	1350	30°12.9'S	39°17.8'W	4598	20	3600 m to bottom
147	1351	30°12.8'S	39°23.9'W	4818	20	3650 m to bottom
148	1352	30°12.4'S	39°18.3'W	4669	20	3500 m to bottom
150	1353	29°20.9'S	40°03.7'W	4193	16	3450 m to bottom

APPENDIX I

SOURCES OF ORIGINAL DATA

CHAIN 115, Leg 6

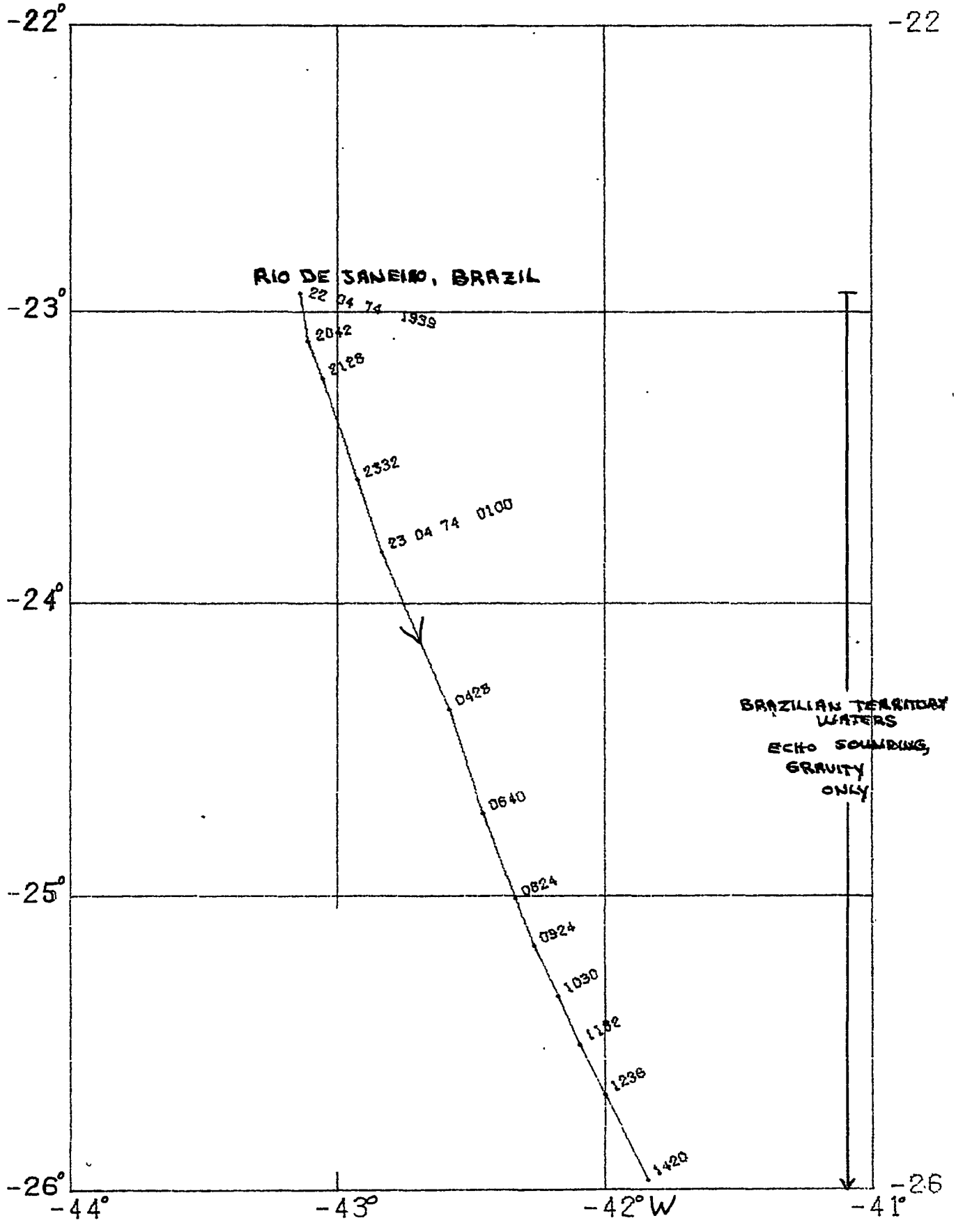
SOURCES OF ORIGINAL DATA, LEG 6

Type of Data	Person to Contact
Echo sounding (3.5 kHz)	Dr. E.T. Bunce, W.H.O.I.
Magnetics	Dr. J.D. Phillips, W.H.O.I.
Gravity	Dr. C.O. Bowin, W.H.O.I.
Seismic reflection profiles	Dr. E.T. Bunce, W.H.O.I.
Current meter	Mr. Joseph L. Reid, Scripps
Nephelometer	Dr. Steve Eittreim, Lamont-Doherty
Cores and dredges	Dr. D.A. Johnson, W.H.O.I.
Heat flow, Thermal probe	Dr. R.P. Von Herzen, W.H.O.I.
Hydrographic stations	Dr. D.A. Johnson, W.H.O.I.
Bottom photographs	" " "
Transponder navigation	" " "

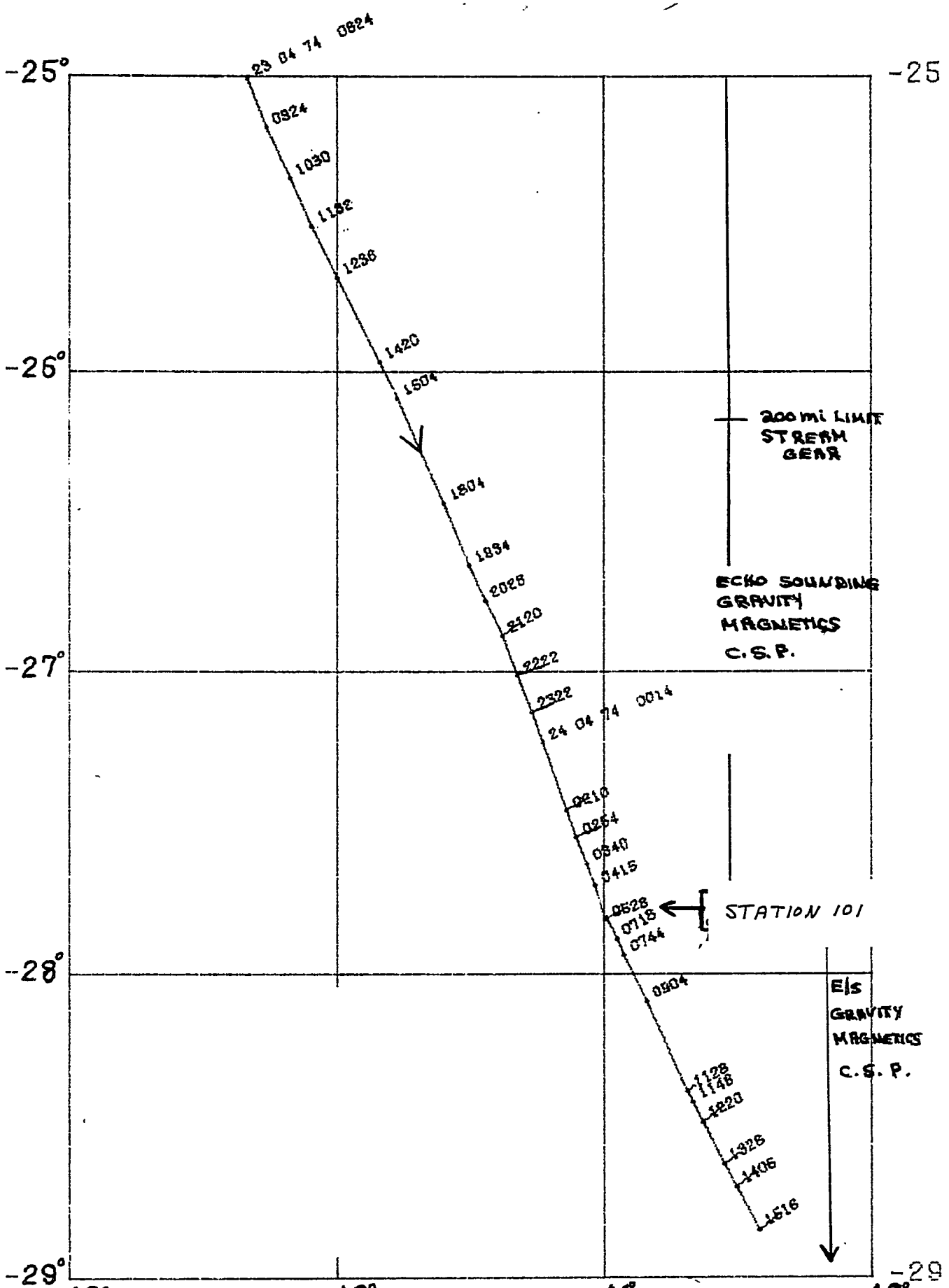
APPENDIX II

NAVIGATION PLOTS

22 April - 23 April, 1974



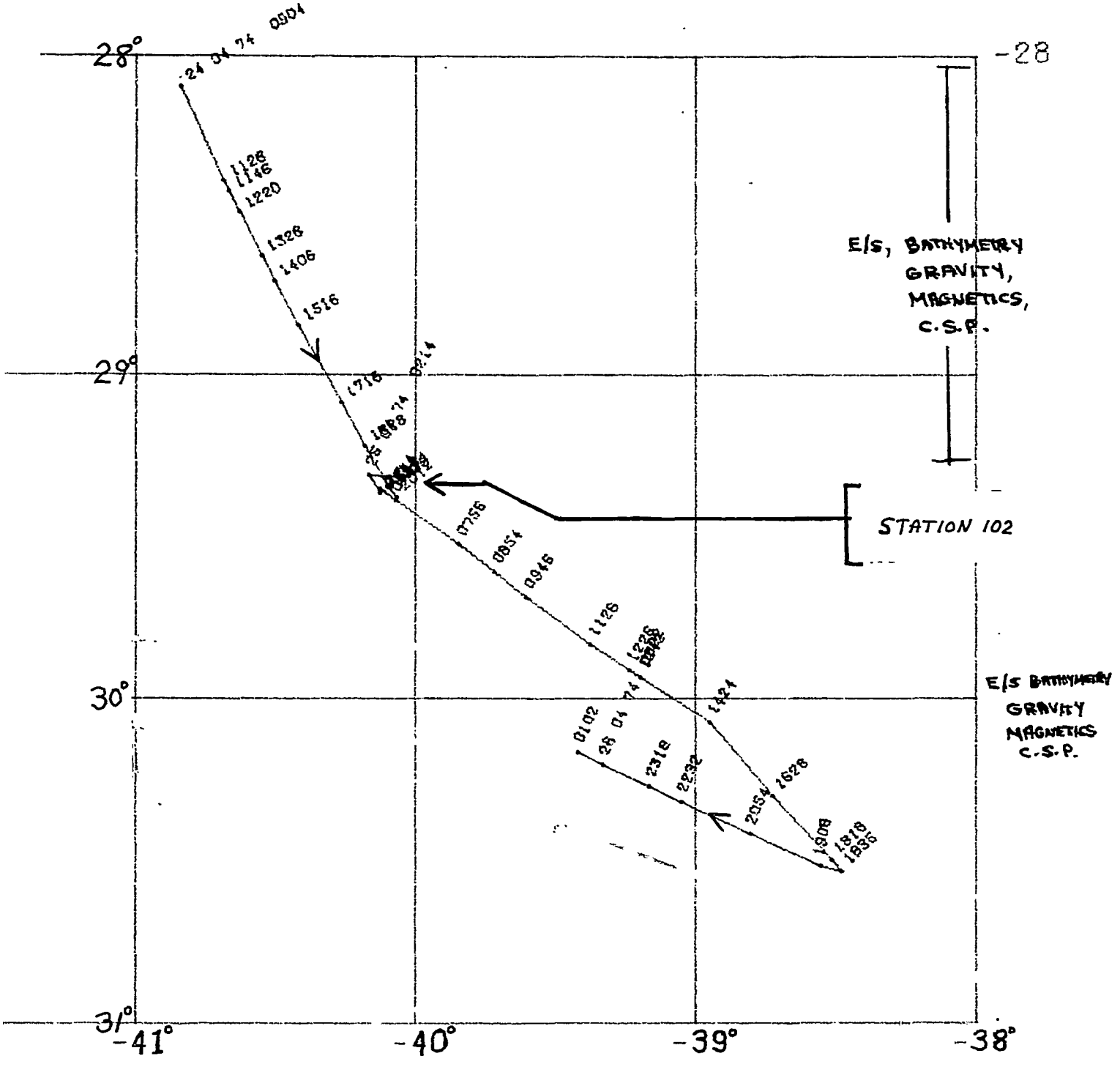
23 April - 24 April, 1974



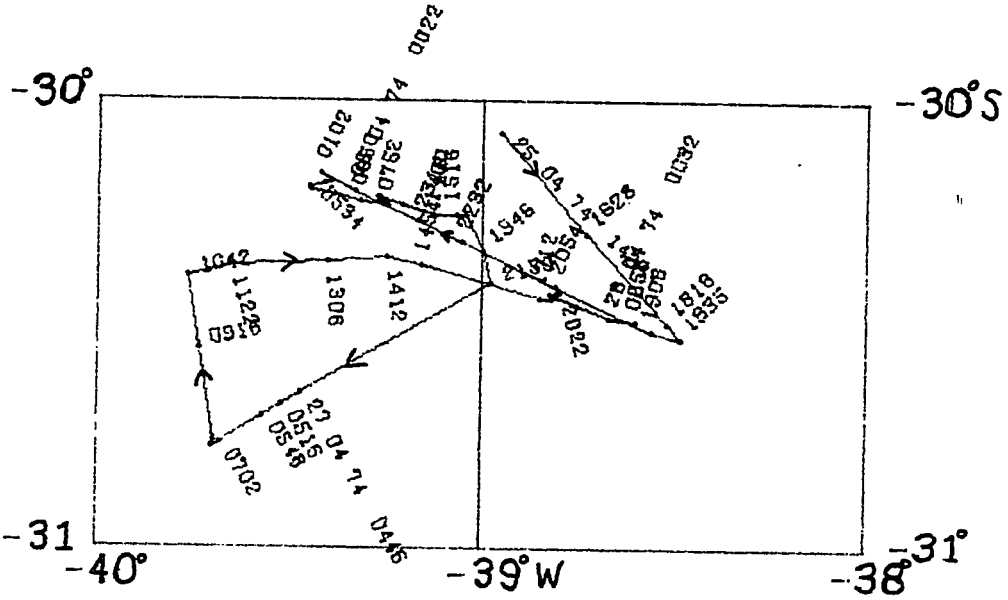
II-3

32

24 April - 26 April, 1974

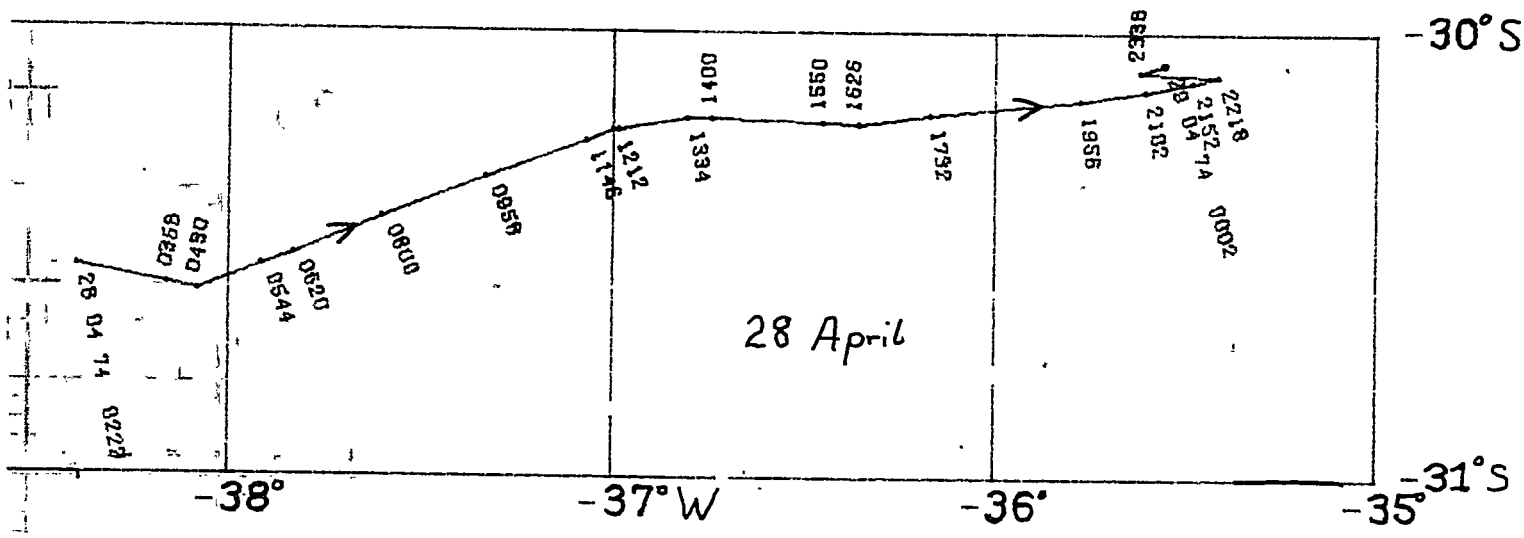


25 April - 27 April, 1974



Stations 103 - 107

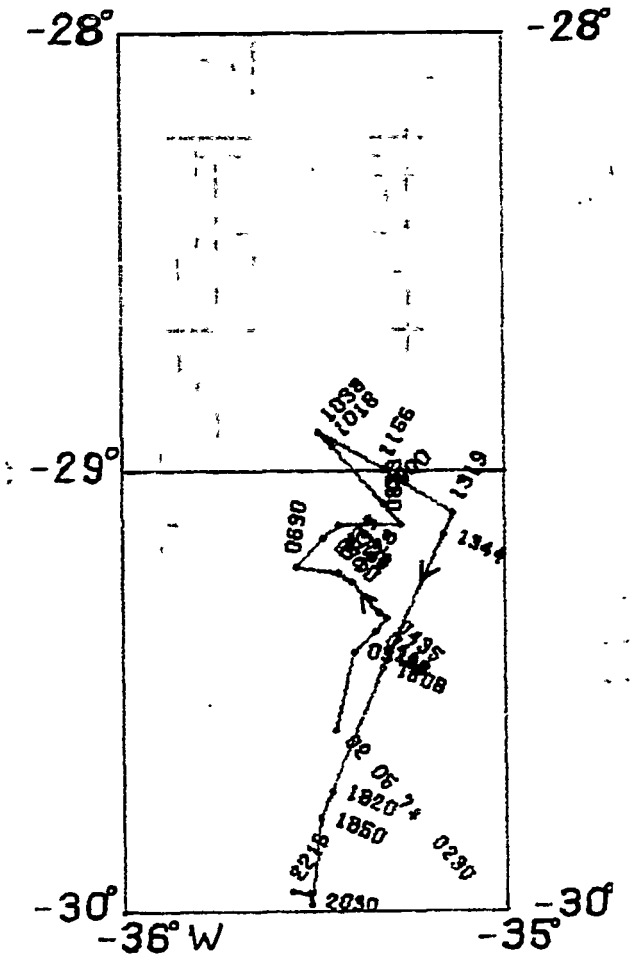
28 April 1974



29 April - 01 May: Working in transponder area
(see Figure 3)

Stations 108 - 114

02 May 1974



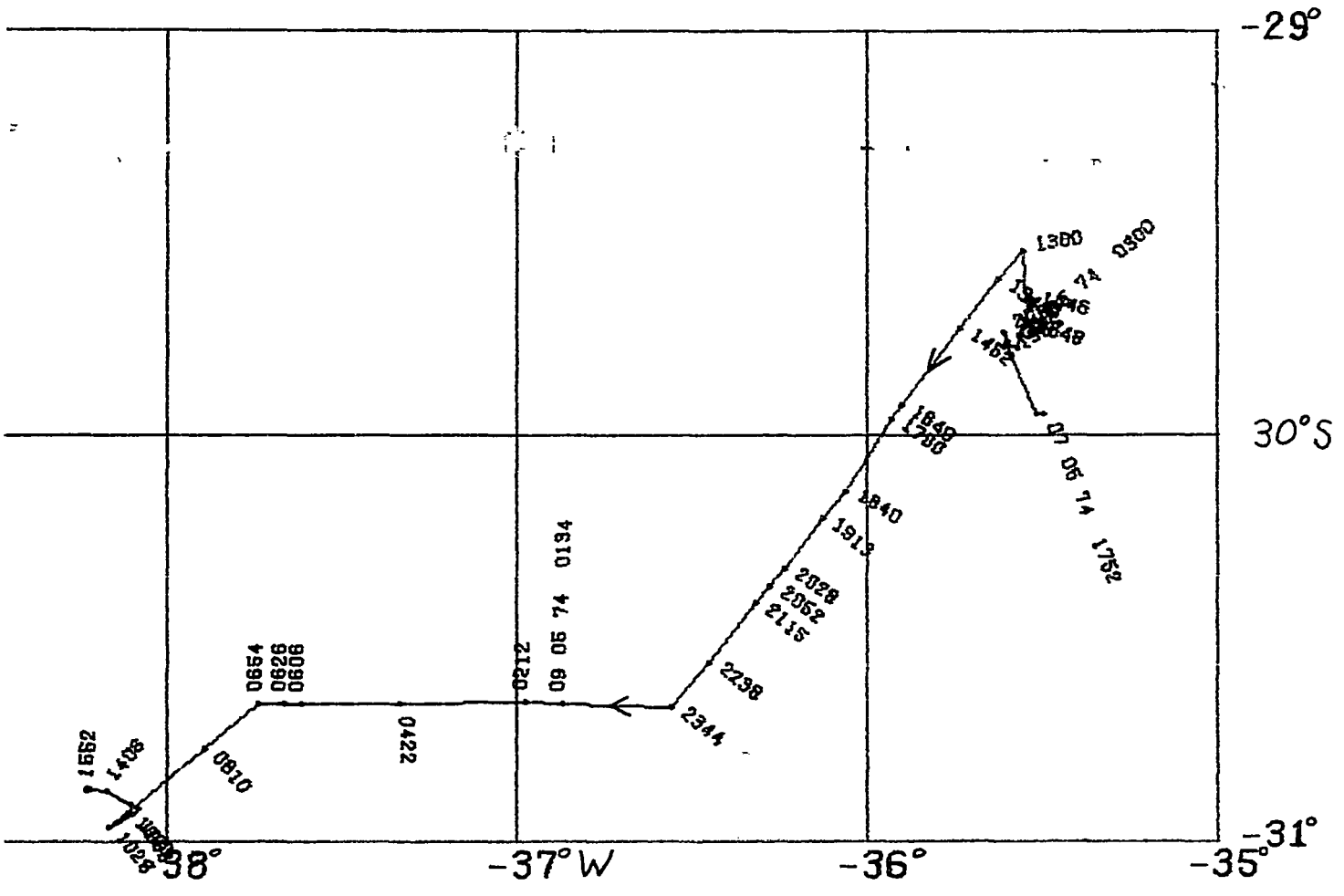
03 May - 07 May : Working in transponder area
(see Figure 3)

Stations 115 - 134

II-7

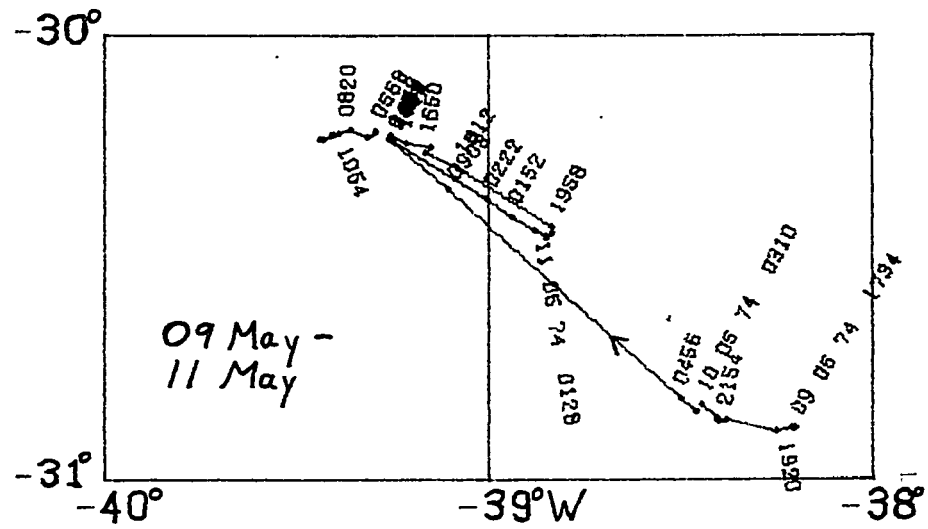
36

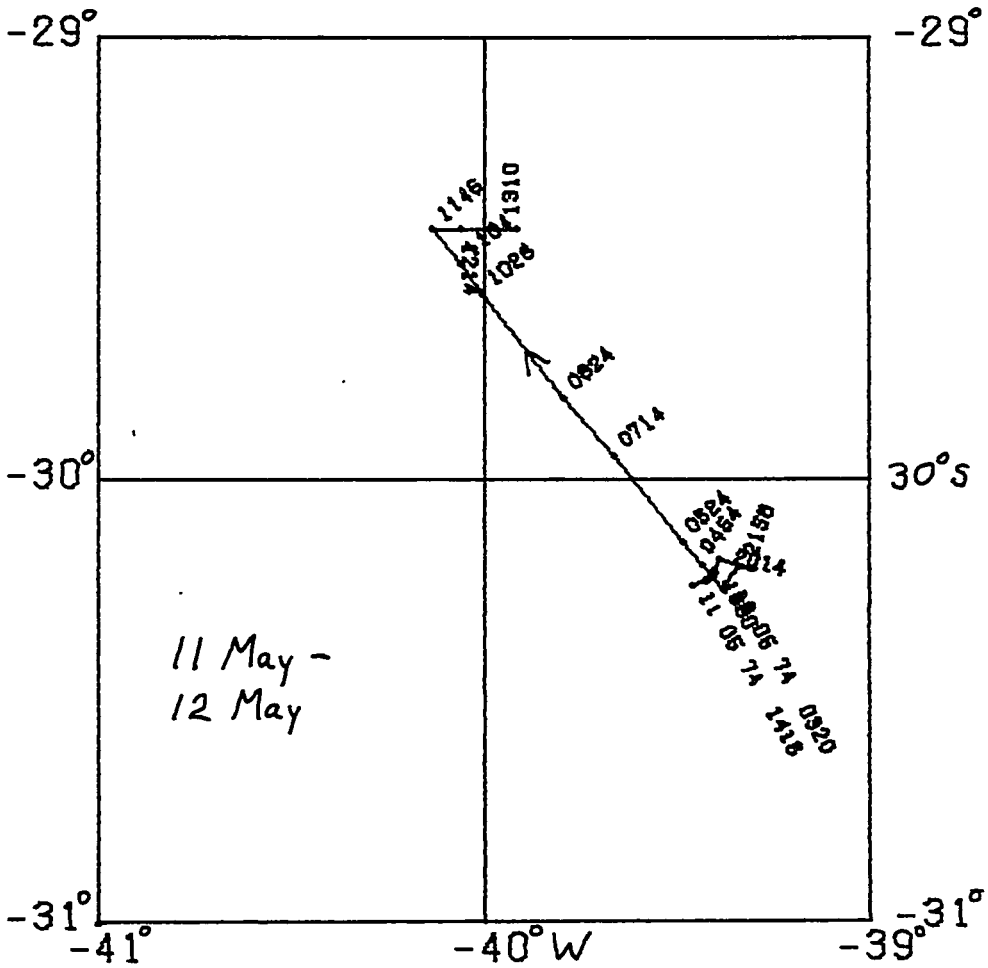
08 May - 09 May, 1974



Stations 135 - 139

09 May - 12 May, 1974

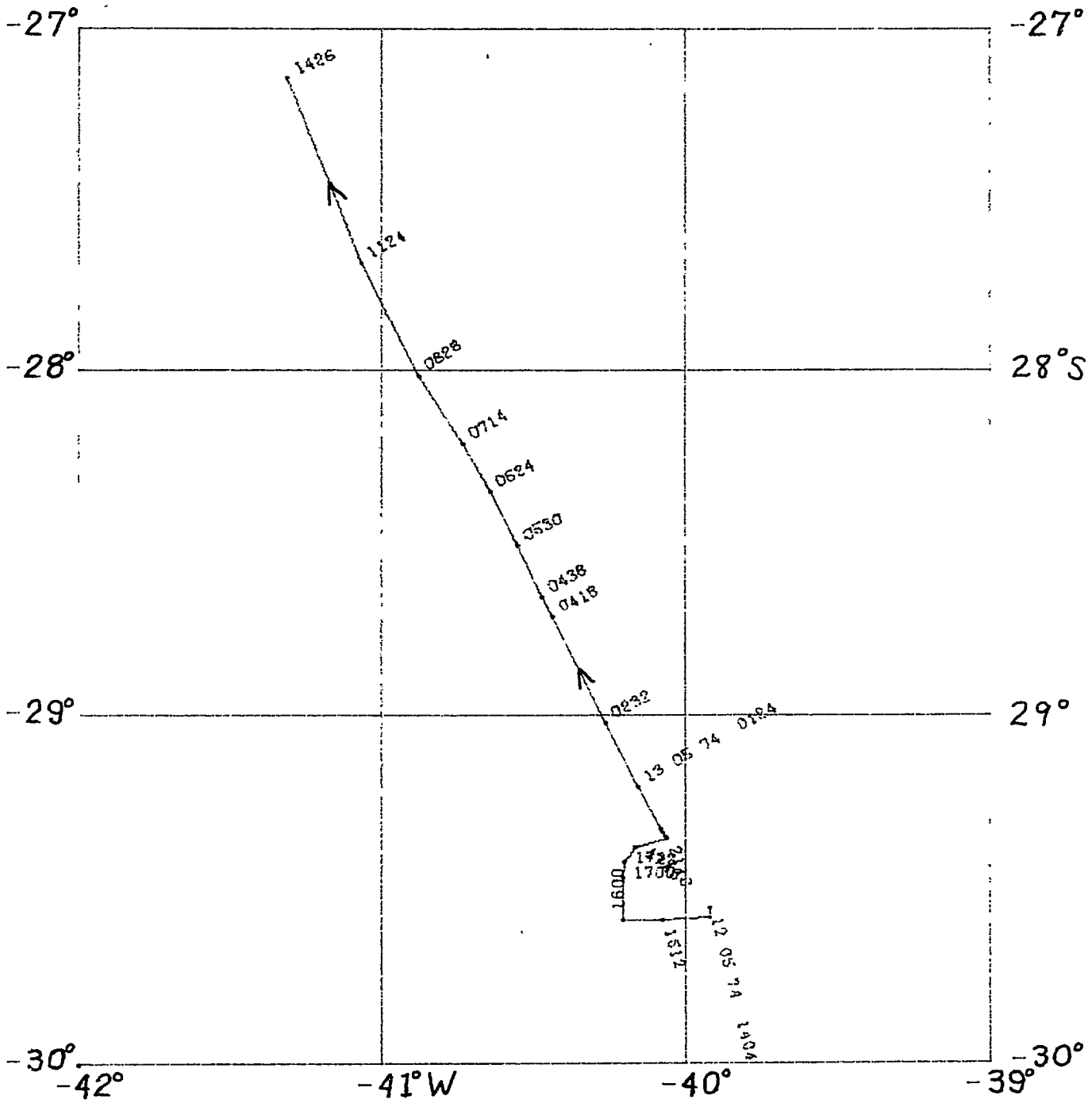




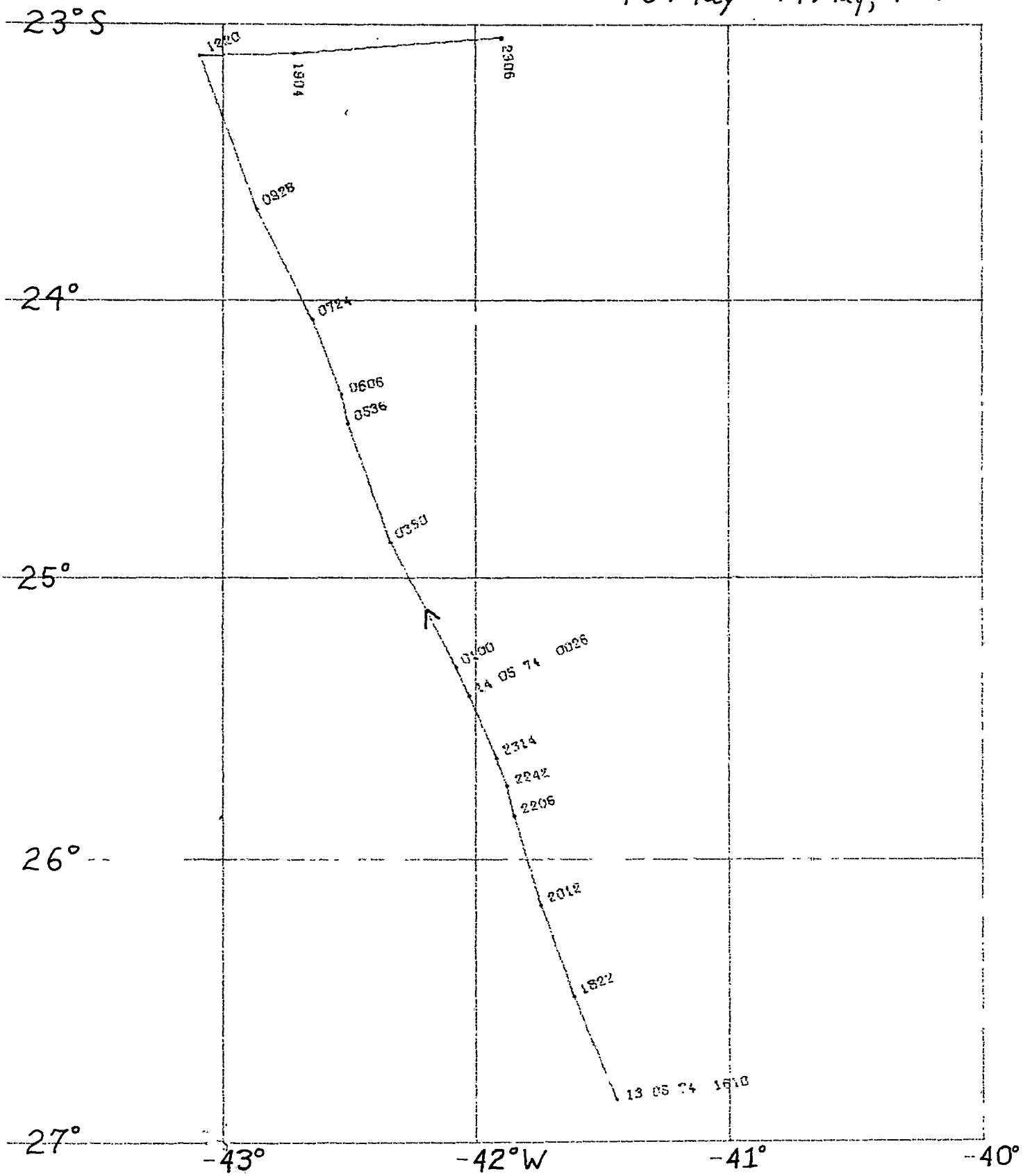
II -9

38

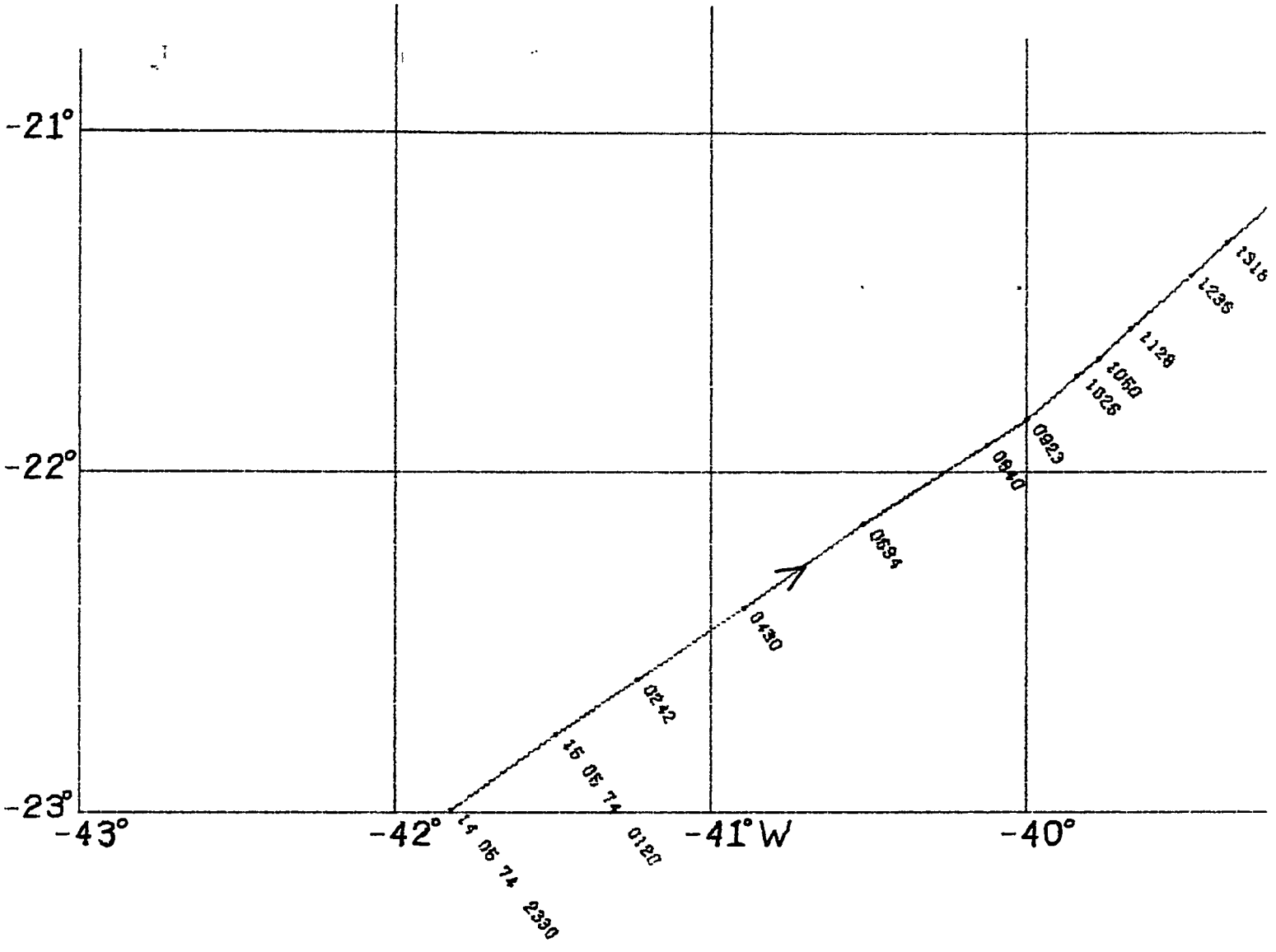
12 May - 13 May, 1974



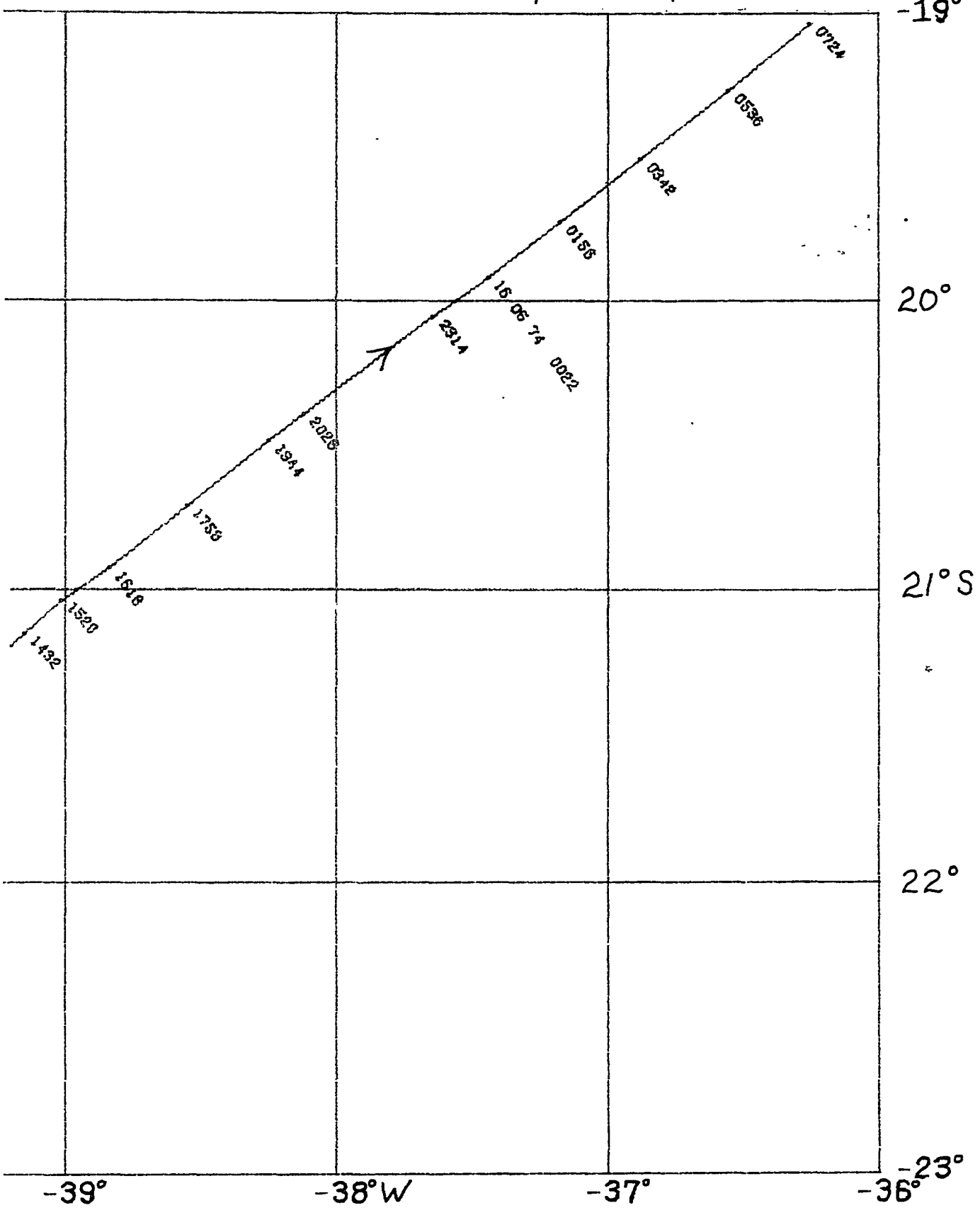
13 May - 14 May, 1974.

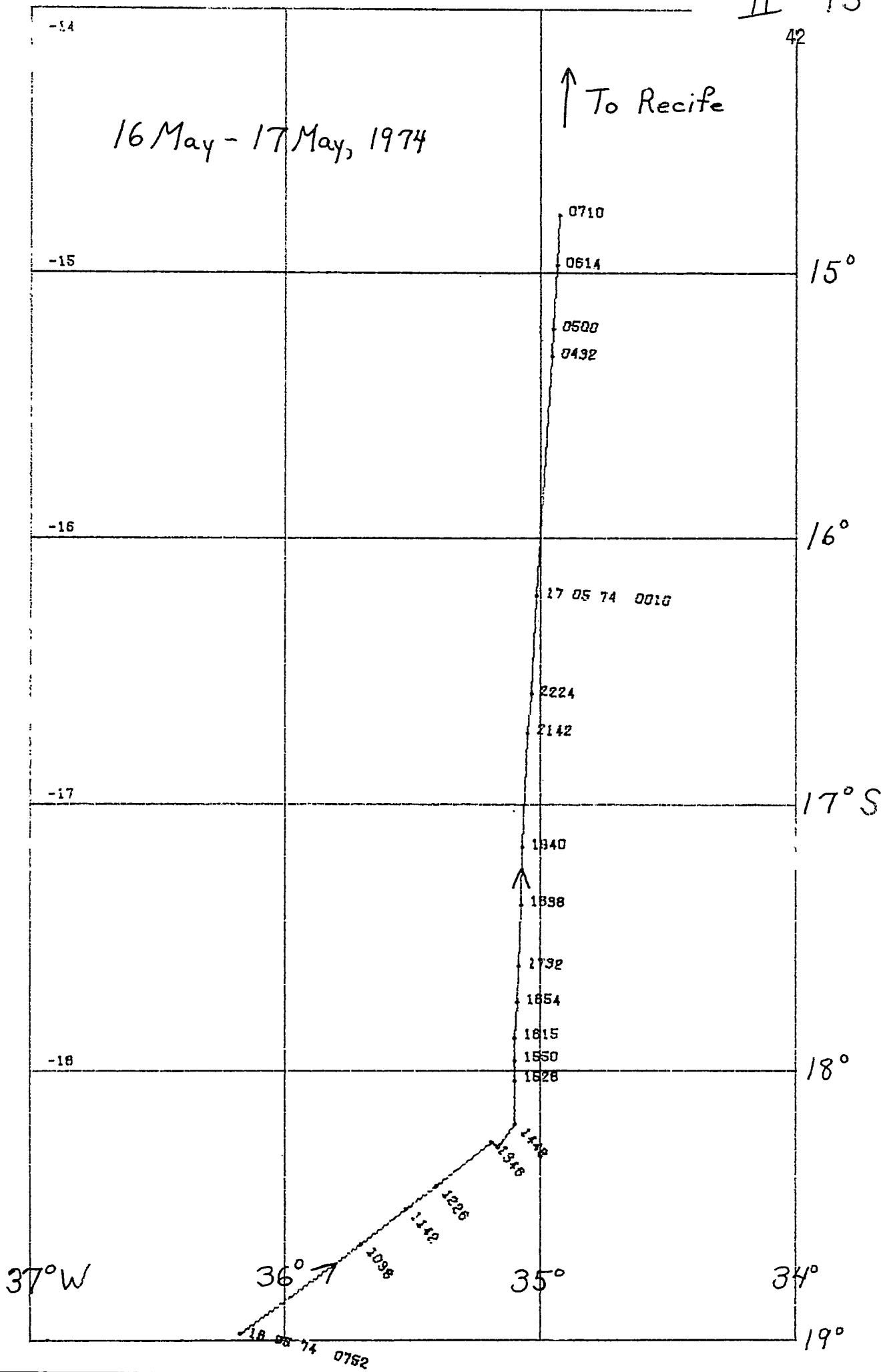


14 May - 15 May, 1974



15 May - 16 May, 1974




16 May - 17 May, 1974
To Recife
42
-14
-15
-16
-17
-18
15°
16°
17° S
18°
19°
37° W
36°
35°
34°
0710
0614
0500
0432
17 05 74 0010
2224
2142
1940
1838
1732
1654
1615
1550
1528
1448
1346
1226
1142
1098
18 05 74 0762

APPENDIX III

LISTING OF FIXES

/P
*
*

	DATE, TIME		LATITUDE (°S)		LONGITUDE (°W)			
0001	2204741939	+03	-22	-56.05	-043	-08.50	00	302
0002	2204742042	+03	-23	-06.03	-043	-06.68	00	902
0003	2204742128	+03	-23	-13.72	-043	-03.19	00	904
0004	2204742332	+03	-23	-34.60	-042	-55.60	00	904
0005	2304740100	+03	-23	-49.50	-042	-50.10	00	902
0006	2304740428	+03	-24	-21.74	-042	-34.76	00	902
0007	2304740640	+03	-24	-43.02	-042	-27.44	00	903
0008	2304740824	+03	-25	-00.74	-042	-20.22	00	902
0009	2304740924	+03	-25	-10.50	-042	-16.00	00	103
0010	2304741030	+03	-25	-20.91	-042	-10.57	00	902
0011	2304741132	+03	-25	-30.54	-042	-05.58	00	904
0012	2304741236	+03	-25	-40.85	-042	-00.12	00	902
0013	2304741420	+03	-25	-58.10	-041	-50.50	00	902
0014	2304741504	+03	-26	-05.50	-041	-46.36	00	904
0015	2304741804	+03	-26	-26.38	-041	-36.04	00	902
0016	2304741934	+03	-26	-38.79	-041	-30.42	00	902
0017	2304742028	+03	-26	-46.01	-041	-26.84	00	902
0018	2304742120	+03	-26	-52.98	-041	-22.81	00	902
0019	2304742222	+03	-27	-00.78	-041	-19.57	00	902
0020	2304742322	+03	-27	-08.00	-041	-16.30	00	904
0021	2404740014	+03	-27	-14.00	-041	-13.84	00	902
0022	2404740210	+03	-27	-27.61	-041	-08.41	00	902
0023	2404740254	+03	-27	-32.88	-041	-06.21	00	904
0024	2404740340	+03	-27	-38.15	-041	-03.87	00	902
0025	2404740415	+03	-27	-42.50	-041	-02.00	00	103
0026	2404740528	+03	-27	-49.17	-040	-59.75	00	902
0027	2404740558	+03	-27	-49.87	-040	-59.56	00	902
0028	2404740627	+03	-27	-49.00	-040	-59.50	00	103
0029	2404740718	+03	-27	-53.29	-040	-56.99	00	902
0030	2404740744	+03	-27	-56.33	-040	-55.40	00	902
0031	2404740904	+03	-28	-05.73	-040	-50.42	00	902
0032	2404741128	+03	-28	-23.42	-040	-41.30	00	900
0033	2404741146	+03	-28	-25.61	-040	-40.19	00	902
0034	2404741220	+03	-28	-29.61	-040	-37.83	00	902
0035	2404741328	+03	-28	-37.75	-040	-33.13	00	902
0036	2404741406	+03	-28	-42.34	-040	-30.36	00	902
0037	2404741516	+03	-28	-50.66	-040	-25.24	00	904
0038	2404741716	+03	-29	-05.06	-040	-16.00	00	902
0039	2404741828	+03	-29	-13.24	-040	-10.66	00	902
0040	2404741936	+03	-29	-20.91	-040	-05.62	00	902
0041	2404742012	+03	-29	-22.76	-040	-03.82	00	902
0042	2404742134	+03	-29	-20.56	-040	-05.56	00	902
0043	2404742320	+03	-29	-20.79	-040	-05.85	00	902
0044	2504740010	+03	-29	-19.98	-040	-05.05	00	902
0045	2504740120	+03	-29	-18.75	-040	-05.28	00	904
0046	2504740214	+03	-29	-18.70	-040	-09.80	00	103
0047	2504740310	+03	-29	-22.10	-040	-07.55	00	904
0048	2504740512	+03	-29	-21.35	-040	-07.63	00	903
0049	2504740532	+03	-29	-21.30	-040	-07.60	00	103
0050	2504740614	+03	-29	-23.40	-040	-04.08	00	903
0051	2504740756	+03	-29	-31.56	-039	-58.77	00	903
0052	2504740854	+03	-29	-36.54	-039	-43.18	00	904
0053	2504740946	+03	-29	-41.08	-039	-36.35	00	904
0054	2504741126	+03	-29	-49.98	-039	-22.60	00	903
0055	2504741226	+03	-29	-54.75	-039	-14.13	00	900
0056	2504741242	+03	-29	-56.08	-039	-11.57	00	902
0057	2504741424	+03	-30	-04.55	-038	-57.07	00	902
0058	2504741628	+03	-30	-17.98	-038	-43.59	00	904

TYPE OF FIX
1=D.R.
3=Radar
9=Satellite

QUALITY
2=good
3=fair
4=poor

0059	2504741818	+03	-30	-29.90	-038	-30.86	00	903
0060	2504741835	+03	-30	-31.90	-038	-28.70	00	103
0061	2504741908	+03	-30	-31.02	-038	-33.31	00	902
0062	2504742054	+03	-30	-24.95	-038	-48.43	00	902
0063	2504742232	+03	-30	-19.85	-039	-03.07	00	902
0064	2504742318	+03	-30	-16.19	-039	-09.84	00	903
0065	2604740022	+03	-30	-12.23	-039	-19.76	00	903
0066	2604740102	+03	-30	-09.87	-039	-25.25	00	902
0067	2604740252	+03	-30	-10.86	-039	-23.58	00	904
0068	2604740348	+03	-30	-11.16	-039	-24.73	00	902
0069	2604740534	+03	-30	-11.63	-039	-27.08	00	902
0070	2604740604	+03	-30	-11.86	-039	-26.76	00	902
0071	2604740650	+03	-30	-13.47	-039	-18.95	00	902
0072	2604740752	+03	-30	-14.14	-039	-14.62	00	902
0073	2604740836	+03	-30	-13.87	-039	-15.36	00	902
0074	2604740950	+03	-30	-13.26	-039	-15.97	00	902
0075	2604741136	+03	-30	-13.15	-039	-15.92	00	902
0076	2604741212	+03	-30	-13.05	-039	-16.25	00	902
0077	2604741330	+03	-30	-14.20	-039	-12.40	00	902
0078	2604741400	+03	-30	-15.50	-039	-07.60	00	103
0079	2604741516	+03	-30	-15.50	-039	-04.00	00	103
0080	2604741728	+03	-30	-15.49	-039	-02.43	00	902
0081	2604741910	+03	-30	-15.50	-039	-02.40	00	103
0082	2604741946	+03	-30	-20.30	-038	-59.60	00	904
0083	2604742150	+03	-30	-24.57	-038	-58.40	00	902
0084	2704740446	+03	-30	-39.41	-039	-28.18	00	902
0085	2704740516	+03	-30	-40.79	-039	-31.09	00	902
0086	2704740548	+03	-30	-42.45	-039	-34.12	00	904
0087	2704740702	+03	-30	-46.11	-039	-40.95	00	902
0088	2704740718	+03	-30	-46.50	-039	-41.90	00	103
0089	2704740728	+03	-30	-45.83	-039	-41.68	00	902
0090	2704740916	+03	-30	-33.29	-039	-44.15	00	903
0091	2704741042	+03	-30	-23.70	-039	-46.00	00	103
0092	2704741122	+03	-30	-22.23	-039	-39.22	00	902
0093	2704741306	+03	-30	-21.70	-039	-24.01	00	902
0094	2704741412	+03	-30	-21.00	-039	-14.70	00	103
0095	2704741454	+03	-30	-22.23	-039	-09.22	00	902
0096	2704741712	+03	-30	-26.49	-038	-50.81	00	902
0097	2704741828	+03	-30	-26.66	-038	-48.79	00	902
0098	2704742022	+03	-30	-25.75	-038	-47.89	00	902
0099	2704742056	+03	-30	-25.70	-038	-47.63	00	903
0100	2704742314	+03	-30	-26.08	-038	-49.21	00	903
0101	2804740032	+03	-30	-29.13	-038	-39.91	00	902
0102	2804740058	+03	-30	-29.76	-038	-35.66	00	902
0103	2804740222	+03	-30	-32.15	-038	-23.63	00	902
0104	2804740358	+03	-30	-34.46	-038	-09.49	00	902
0105	2804740430	+03	-30	-35.10	-038	-04.90	00	103
0106	2804740544	+03	-30	-31.88	-037	-54.78	00	902
0107	2804740620	+03	-30	-30.18	-037	-49.68	00	902
0108	2804740800	+03	-30	-25.28	-037	-35.93	00	902
0109	2804740958	+03	-30	-19.79	-037	-19.73	00	902
0110	2804741146	+03	-30	-14.74	-037	-04.18	00	902
0111	2804741212	+03	-30	-13.39	-037	-00.10	00	902
0112	2804741218	+03	-30	-13.20	-036	-59.10	00	103
0113	2804741334	+03	-30	-11.72	-036	-48.23	00	902
0114	2804741400	+03	-30	-11.83	-036	-44.27	00	902
0115	2804741550	+03	-30	-12.28	-036	-27.11	00	902
0116	2804741626	+03	-30	-12.40	-036	-21.40	00	103
0117	2804741732	+03	-30	-11.11	-036	-10.35	00	904
0118	2804741956	+03	-30	-09.19	-035	-46.56	00	903

0119	2804742102	+03	-30	-07.89	-035	-36.39	00	903
0120	2804742152	+03	-30	-06.62	-035	-28.71	00	902
0121	2804742218	+03	-30	-05.73	-035	-24.87	00	103
0122	2804742338	+03	-30	-05.20	-035	-37.10	00	103
0123	2904740002	+03	-30	-04.15	-035	-33.45	00	902
0124	2904740100	+03	-30	-02.10	-035	-24.20	00	103
0125	2904740128	+03	-30	-01.29	-035	-28.46	00	902
0126	2904740150	+03	-30	-01.18	-035	-31.99	00	902
0127	2904740234	+03	-30	-01.00	-035	-39.00	00	103
0128	2904740310	+03	-29	-58.98	-035	-34.35	00	902
0129	2904740344	+03	-29	-57.90	-035	-29.30	00	103
0130	2904740456	+03	-29	-56.78	-035	-40.40	00	902
0131	2904740513	+03	-29	-56.70	-035	-43.10	00	103
0132	2904740537	+03	-29	-56.70	-035	-39.40	00	103
0133	2904740640	+03	-29	-55.00	-035	-29.50	00	103
0134	2904740700	+03	-29	-57.25	-035	-34.05	00	902
0135	2904740737	+03	-29	-59.80	-035	-39.00	00	103
0136	2904740848	+03	-30	-00.26	-035	-29.88	00	903
0137	2904740910	+03	-30	-03.07	-035	-30.42	00	902
0138	2904740942	+03	-30	-07.50	-035	-31.00	00	103
0139	2904741058	+03	-29	-57.52	-035	-36.27	00	902
0140	2904741117	+03	-29	-55.10	-035	-37.00	00	103
0141	2904741244	+03	-29	-58.64	-035	-33.26	00	902
0142	2904741301	+03	-29	-59.60	-035	-34.10	00	103
0143	2904741810	+03	-30	-00.22	-035	-34.71	00	902
0144	2904741954	+03	-30	-00.38	-035	-35.51	00	902
0145	2904742104	+03	-30	-00.28	-035	-35.89	00	902
0146	2904742312	+03	-30	-00.17	-035	-30.82	00	902
0147	3004740222	+03	-29	-56.68	-035	-33.89	00	904
0148	3004740436	+03	-29	-59.76	-035	-32.91	00	903
0149	3004740556	+03	-29	-56.93	-035	-32.99	00	902
0150	3004740740	+03	-29	-57.00	-035	-33.37	00	902
0151	3004740824	+03	-29	-58.16	-035	-32.12	00	903
0152	3004741210	+03	-29	-59.81	-035	-34.25	00	902
0153	3004741338	+03	-30	-00.39	-035	-35.31	00	900
0154	3004741356	+03	-29	-59.51	-035	-35.26	00	903
0155	3004741632	+03	-29	-57.76	-035	-33.99	00	903
0156	3004741704	+03	-29	-57.61	-035	-33.51	00	904
0157	3004741848	+03	-29	-59.14	-035	-34.31	00	902
0158	3004742034	+03	-29	-57.93	-035	-33.65	00	902
0159	3004742202	+03	-29	-58.99	-035	-35.01	00	904
0160	3004742344	+03	-29	-47.56	-035	-33.70	00	900
0161	0105740002	+03	-29	-45.19	-035	-33.62	00	902
0162	0105740132	+03	-29	-32.68	-035	-33.26	00	902
0163	0105740152	+03	-29	-29.90	-035	-33.22	00	902
0164	0105740506	+03	-29	-05.12	-035	-32.22	00	902
0165	0105740554	+03	-28	-59.00	-035	-32.00	00	103
0166	0105740632	+03	-28	-59.13	-035	-37.90	00	902
0167	0105740700	+03	-28	-59.20	-035	-42.50	00	103
0168	0105740720	+03	-29	-01.45	-035	-42.24	00	902
0169	0105740818	+03	-29	-09.14	-035	-41.30	00	902
0170	0105740920	+03	-29	-17.71	-035	-40.34	00	902
0171	0105741118	+03	-29	-34.09	-035	-38.65	00	902
0172	0105741246	+03	-29	-46.83	-035	-36.67	00	900
0173	0105741415	+03	-29	-59.80	-035	-33.50	00	103
0174	0105741539	+03	-29	-56.40	-035	-33.50	00	103
0175	0105741720	+03	-29	-58.60	-035	-34.60	00	103
0176	0105741744	+03	-29	-57.68	-035	-34.20	00	902
0177	0105741800	+03	-29	-56.70	-035	-34.00	00	103
0178	0105742254	+03	-29	-56.36	-035	-31.66	00	903

0179	0105742344	+03	-29	-56.30	-035	-32.80	00	103	
0180	0205740038	+03	-29	-49.98	-035	-30.75	00	902	
0181	0205740230	+03	-29	-35.51	-035	-26.72	00	904	
0182	0205740349	+03	-29	-25.00	-035	-23.70	00	103	
0183	0205740418	+03	-29	-22.03	-035	-20.44	00	902	
0184	0205740435	+03	-29	-20.30	-035	-18.60	00	103	
0185	0205740444	+03	-29	-19.45	-035	-19.80	00	902	
0186	0205740528	+03	-29	-15.25	-035	-24.09	00	903	
0187	0205740543	+03	-29	-13.90	-035	-26.00	00	103	
0188	0205740630	+03	-29	-13.04	-035	-32.58	00	902	
0189	0205740710	+03	-29	-09.09	-035	-28.40	00	902	
0190	0205740728	+03	-29	-07.20	-035	-26.20	00	103	
0191	0205740833	+03	-29	-07.20	-035	-16.10	00	103	
0192	0205740900	+03	-29	-04.25	-035	-19.04	00	904	
0193	0205741018	+03	-28	-56.46	-035	-27.83	00	902	
0194	0205741038	+03	-28	-54.60	-035	-29.00	00	103	
0195	0205741156	+03	-28	-59.72	-035	-18.90	00	902	
0196	0205741319	+03	-29	-05.70	-035	-08.00	00	103	
0197	0205741344	+03	-29	-08.68	-035	-09.69	00	902	
0198	0205741608	+03	-29	-26.95	-035	-19.28	00	902	
0199	0205741820	+03	-29	-43.81	-035	-27.26	00	902	
0200	0205741850	+03	-29	-47.40	-035	-29.10	00	103	
0201	0205742030	+03	-29	-59.30	-035	-30.60	00	903	
0202	0205742133	+03	-29	-57.60	-035	-30.90	00	103	
0203	0205742216	+03	-29	-57.40	-035	-33.70	00	103	
0204	0305740037	+03	-29	-56.10	-035	-35.40	00	103	
0205	0305740328	+03	-29	-56.12	-035	-34.13	00	902	
0206	0305740516	+03	-29	-56.53	-035	-34.15	00	903	
0207	0305740604	+03	-29	-55.45	-035	-33.72	00	902	
0208	0305740728	+03	-29	-54.98	-035	-33.53	00	903	
0209	0305740750	+03	-29	-54.83	-035	-34.99	00	902	
0210	0305740934	+03	-29	-56.75	-035	-32.96	00	902	
0211	0305741250	+03	-29	-57.57	-035	-32.99	00	902	
0212	0305741522	+03	-29	-59.85	-035	-34.16	00	902	
0213	0305741734	+03	-30	-00.35	-035	-33.18	00	902	
0214	0305741850	+03	-29	-58.26	-035	-32.36	00	904	
0215	0305741924	+03	-29	-57.84	-035	-33.57	00	902	
0216	0305742022	+03	-29	-59.04	-035	-31.79	00	902	
0217	0305742258	+03	-29	-58.38	-035	-32.80	00	902	
0218	0405740240	+03	-29	-56.36	-035	-32.07	00	902	
0219	0405740426	+03	-29	-56.30	-035	-31.37	00	902	
0220	0405740452	+03	-29	-56.33	-035	-32.42	00	902	
0221	0405740638	+03	-29	-57.33	-035	-32.89	00	902	
0222	0405740830	+03	-29	-58.46	-035	-31.42	00	903	
0223	0405741032	+03	-29	-57.73	-035	-31.51	00	902	
0224	0405741158	+03	-29	-57.86	-035	-35.08	00	904	
0225	0405741346	+03	-29	-57.01	-035	-34.92	00	900	
0226	0405741620	+03	-29	-57.87	-035	-33.17	00	902	
0227	0405741752	+03	-29	-57.04	-035	-32.46	00	902	
0228	0405741936	+03	-29	-57.45	-035	-32.44	00	902	
0229	0405742034	+03	-29	-57.68	-035	-33.74	00	902	
0230	0405742226	+03	-29	-58.37	-035	-34.43	00	902	
0231	0405742352	+03	-29	-58.03	-035	-33.86	00	902	
0232	0505740140	+03	-29	-55.44	-035	-32.39	00	902	
0233	0505740301	+03	-29	-54.10	-035	-34.50	00	103	
0234	0505740404	+03	-29	-48.33	-035	-28.67	00	904	
0235	0505740430	+03	-29	-45.70	-035	-26.10	00	103	
0236	0505740630	+03	-29	-35.00	-035	-14.00	00	103	
0237	0505740740	+03	-29	-38.42	-035	-05.58	00	904	
0238	0505741106	+03	-29	-53.11	-035	-28.75	00	902	

0239	0505741252	+03	-30	-00.55	-035	-40.30	00	902
0240	0505741530	+03	-29	-57.39	-035	-34.14	00	904
0241	0505741600	+03	-29	-56.60	-035	-32.65	00	904
0242	0505741648	+03	-29	-57.06	-035	-33.35	00	904
0243	0505741718	+03	-29	-58.00	-035	-34.70	00	103
0244	0505741742	+03	-29	-57.51	-035	-34.72	00	904
0245	0505741830	+03	-29	-57.71	-035	-34.01	00	902
0246	0505741932	+03	-29	-57.27	-035	-32.98	00	903
0247	0505742016	+03	-29	-57.41	-035	-32.14	00	902
0248	0505742130	+03	-29	-57.25	-035	-31.85	00	902
0249	0505742258	+03	-29	-57.06	-035	-33.32	00	903
0250	0505742320	+03	-29	-55.85	-035	-33.24	00	903
0251	0605740042	+03	-29	-56.90	-035	-32.82	00	902
0252	0605740250	+03	-29	-57.37	-035	-32.64	00	902
0253	0605740436	+03	-29	-56.64	-035	-31.14	00	902
0254	0605740500	+03	-29	-56.68	-035	-33.18	00	902
0255	0605740614	+03	-29	-57.92	-035	-33.11	00	902
0256	0605740646	+03	-29	-56.80	-035	-32.83	00	902
0257	0605740802	+03	-29	-54.60	-035	-36.37	00	902
0258	0605740848	+03	-29	-49.91	-035	-42.00	00	902
0259	0605741012	+03	-29	-52.87	-035	-38.82	00	904
0260	0605741036	+03	-29	-54.26	-035	-35.37	00	902
0261	0605741156	+03	-29	-57.72	-035	-31.27	00	904
0262	0605741344	+03	-29	-59.44	-035	-33.58	00	903
0263	0605741630	+03	-30	-00.43	-035	-32.73	00	902
0264	0605741654	+03	-30	-00.73	-035	-33.01	00	902
0265	0605741840	+03	-29	-59.39	-035	-33.33	00	902
0266	0605741908	+03	-29	-59.71	-035	-33.67	00	902
0267	0605742042	+03	-30	-00.72	-035	-33.34	00	902
0268	0605742212	+03	-30	-00.12	-035	-33.55	00	904
0269	0605742230	+03	-30	-00.44	-035	-33.02	00	902
0270	0605742348	+03	-30	-01.30	-035	-32.97	00	904
0271	0705740136	+03	-29	-59.32	-035	-31.53	00	903
0272	0705740204	+03	-29	-57.44	-035	-31.35	00	904
0273	0705740510	+03	-29	-57.50	-035	-33.47	00	903
0274	0705740538	+03	-29	-57.18	-035	-33.34	00	904
0275	0705740558	+03	-29	-56.80	-035	-32.96	00	902
0276	0705740654	+03	-29	-56.68	-035	-32.76	00	902
0277	0705740802	+03	-30	-00.12	-035	-34.58	00	903
0278	0705740842	+03	-30	-00.60	-035	-34.15	00	904
0279	0705740952	+03	-30	-00.93	-035	-34.84	00	904
0280	0705741102	+03	-30	-01.48	-035	-33.83	00	902
0281	0705741248	+03	-29	-57.04	-035	-33.55	00	902
0282	0705741358	+03	-29	-59.89	-035	-33.96	00	902
0283	0705741752	+03	-29	-56.95	-035	-29.83	00	902
0284	0705741842	+03	-29	-56.90	-035	-30.80	00	103
0285	0705741956	+03	-29	-48.17	-035	-35.35	00	903
0286	0705742030	+03	-29	-44.70	-035	-36.60	00	103
0287	0705742140	+03	-29	-46.26	-035	-36.03	00	904
0288	0705742254	+03	-29	-46.75	-035	-36.28	00	902
0289	0705742330	+03	-29	-46.68	-035	-35.86	00	904
0290	0805740300	+03	-29	-47.12	-035	-34.23	00	902
0291	0805740448	+03	-29	-45.26	-035	-33.85	00	902
0292	0805740548	+03	-29	-44.04	-035	-33.07	00	902
0293	0805740656	+03	-29	-43.52	-035	-32.77	00	902
0294	0805740732	+03	-29	-43.04	-035	-33.13	00	902
0295	0805740858	+03	-29	-41.96	-035	-32.84	00	902
0296	0805741046	+03	-29	-40.45	-035	-32.22	00	902
0297	0805741140	+03	-29	-39.80	-035	-31.70	00	103
0298	0805741208	+03	-29	-39.99	-035	-32.75	00	900

0299	0805741300	+03	-29	-32.70	-035	-33.20	00	103
0300	0805741342	+03	-29	-37.01	-035	-37.38	00	904
0301	0805741452	+03	-29	-44.30	-035	-44.03	00	902
0302	0805741640	+03	-29	-55.59	-035	-54.06	00	902
0303	0805741700	+03	-29	-57.63	-035	-55.85	00	903
0304	0805741840	+03	-30	-08.32	-036	-03.54	00	904
0305	0805741913	+03	-30	-12.20	-036	-07.60	00	103
0306	0805742028	+03	-30	-19.75	-036	-14.06	00	903
0307	0805742052	+03	-30	-22.28	-036	-16.43	00	902
0308	0805742115	+03	-30	-24.80	-036	-19.00	00	103
0309	0805742238	+03	-30	-33.63	-036	-26.94	00	902
0310	0805742344	+03	-30	-40.05	-036	-33.23	00	902
0311	0905740134	+03	-30	-39.48	-036	-51.88	00	903
0312	0905740212	+03	-30	-39.35	-036	-58.17	00	903
0313	0905740422	+03	-30	-39.61	-037	-19.69	00	902
0314	0905740606	+03	-30	-39.59	-037	-36.52	00	902
0315	0905740626	+03	-30	-39.57	-037	-39.65	00	902
0316	0905740654	+03	-30	-39.50	-037	-44.00	00	103
0317	0905740810	+03	-30	-46.18	-037	-53.35	00	902
0318	0905741000	+03	-30	-55.85	-038	-06.75	00	902
0319	0905741028	+03	-30	-58.00	-038	-10.00	00	103
0320	0905741058	+03	-30	-55.86	-038	-05.70	00	900
0321	0905741144	+03	-30	-55.00	-038	-04.83	00	904
0322	0905741244	+03	-30	-54.57	-038	-05.86	00	900
0323	0905741304	+03	-30	-54.48	-038	-06.12	00	902
0324	0905741406	+03	-30	-52.46	-038	-10.31	00	902
0325	0905741552	+03	-30	-52.37	-038	-13.01	00	902
0326	0905741616	+03	-30	-52.28	-038	-13.52	00	903
0327	0905741734	+03	-30	-53.07	-038	-12.14	00	902
0328	0905741808	+03	-30	-53.20	-038	-12.41	00	902
0329	0905741908	+03	-30	-53.10	-038	-12.60	00	103
0330	0905741920	+03	-30	-53.43	-038	-14.93	00	902
0331	0905742154	+03	-30	-51.89	-038	-22.72	00	902
0332	0905742310	+03	-30	-52.37	-038	-23.96	00	902
0333	1005740036	+03	-30	-52.11	-038	-24.09	00	900
0334	1005740054	+03	-30	-51.98	-038	-24.23	00	902
0335	1005740137	+03	-30	-51.70	-038	-24.30	00	103
0336	1005740310	+03	-30	-49.95	-038	-26.81	00	902
0337	1005740425	+03	-30	-50.90	-038	-27.69	00	103
0338	1005740456	+03	-30	-49.07	-038	-30.03	00	902
0339	1005740908	+03	-30	-20.90	-039	-06.43	00	902
0340	1005741024	+03	-30	-13.99	-039	-15.68	00	903
0341	1005741150	+03	-30	-13.85	-039	-15.75	00	904
0342	1005741212	+03	-30	-13.78	-039	-15.41	00	902
0343	1005741338	+03	-30	-13.45	-039	-15.22	00	902
0344	1005741358	+03	-30	-14.55	-039	-13.02	00	904
0345	1005741650	+03	-30	-15.18	-039	-09.12	00	902
0346	1005741735	+03	-30	-16.00	-039	-10.00	00	103
0347	1005741812	+03	-30	-17.87	-039	-04.86	00	902
0348	1005741958	+03	-30	-25.77	-038	-50.03	00	903
0349	1005742100	+03	-30	-26.52	-038	-49.97	00	902
0350	1005742218	+03	-30	-27.38	-038	-50.95	00	903
0351	1105740002	+03	-30	-27.14	-038	-50.98	00	900
0352	1105740113	+03	-30	-27.10	-038	-51.00	00	103
0353	1105740128	+03	-30	-26.18	-038	-52.90	00	903
0354	1105740152	+03	-30	-24.40	-038	-56.38	00	904
0355	1105740222	+03	-30	-22.21	-039	-00.29	00	902
0356	1105740408	+03	-30	-14.44	-039	-14.91	00	902
0357	1105740558	+03	-30	-13.00	-039	-17.72	00	902
0358	1105740618	+03	-30	-12.95	-039	-17.79	00	902

0359	1105740744	+03	-30	-13.71	-039	-18.97	00	902
0360	1105740820	+03	-30	-12.80	-039	-21.52	00	902
0361	1105741010	+03	-30	-13.19	-039	-23.54	00	902
0362	1105741054	+03	-30	-13.61	-039	-24.17	00	902
0363	1105741120	+03	-30	-13.66	-039	-24.68	00	902
0364	1105741240	+03	-30	-14.02	-039	-25.89	00	900
0365	1105741306	+03	-30	-14.13	-039	-26.44	00	902
0366	1105741416	+03	-30	-14.49	-039	-27.64	00	902
0367	1105741600	+03	-30	-12.84	-039	-23.87	00	902
0368	1105741708	+03	-30	-13.38	-039	-24.19	00	903
0369	1105741808	+03	-30	-14.12	-039	-25.65	00	902
0370	1105741852	+03	-30	-12.52	-039	-24.37	00	904
0371	1105742014	+03	-30	-10.82	-039	-23.26	00	902
0372	1105742158	+03	-30	-12.32	-039	-18.54	00	902
0373	1105742246	+03	-30	-12.37	-039	-18.35	00	902
0374	1105742310	+03	-30	-12.31	-039	-18.10	00	902
0375	1205740032	+03	-30	-12.01	-039	-20.35	00	902
0376	1205740320	+03	-30	-14.21	-039	-22.42	00	902
0377	1205740411	+03	-30	-15.00	-039	-22.70	00	103
0378	1205740454	+03	-30	-11.68	-039	-26.20	00	904
0379	1205740524	+03	-30	-08.69	-039	-29.22	00	902
0380	1205740714	+03	-29	-56.87	-039	-39.91	00	900
0381	1205740824	+03	-29	-48.97	-039	-47.55	00	904
0382	1205741028	+03	-29	-34.75	-040	-00.20	00	902
0383	1205741104	+03	-29	-30.70	-040	-03.69	00	902
0384	1205741146	+03	-29	-26.06	-040	-07.98	00	904
0385	1205741214	+03	-29	-25.90	-040	-03.51	00	902
0386	1205741310	+03	-29	-25.90	-039	-55.00	00	103
0387	1205741404	+03	-29	-33.41	-039	-55.27	00	904
0388	1205741415	+03	-29	-35.00	-039	-55.20	00	103
0389	1205741512	+03	-29	-35.32	-040	-04.45	00	902
0390	1205741600	+03	-29	-35.30	-040	-12.20	00	103
0391	1205741700	+03	-29	-27.95	-040	-12.18	00	902
0392	1205741722	+03	-29	-25.40	-040	-12.10	00	103
0393	1205741746	+03	-29	-22.93	-040	-09.80	00	902
0394	1205742110	+03	-29	-21.25	-040	-03.70	00	902
0395	1205742220	+03	-29	-20.88	-040	-03.75	00	903
0396	1305740006	+03	-29	-20.20	-040	-04.37	00	902
0397	1305740030	+03	-29	-19.60	-040	-04.70	00	103
0398	1305740124	+03	-29	-12.29	-040	-09.26	00	903
0399	1305740232	+03	-29	-01.20	-040	-15.75	00	902
0400	1305740418	+03	-28	-42.72	-040	-26.07	00	902
0401	1305740438	+03	-28	-39.23	-040	-28.17	00	902
0402	1305740530	+03	-28	-30.24	-040	-33.11	00	902
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0404	1305740714	+03	-28	-12.83	-040	-43.79	00	902
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0411	1305742206	+03	-25	-50.79	-041	-50.68	00	902
0412	1305742242	+03	-25	-44.29	-041	-52.36	00	902
0413	1305742314	+03	-25	-38.31	-041	-54.88	00	902
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0416	1405740330	+03	-24	-52.38	-042	-20.14	00	902
0417	1405740536	+03	-24	-26.66	-042	-30.35	00	902
0418	1405740606	+03	-24	-20.33	-042	-31.66	00	902

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0446  1605740536 +03 -19 -16.18 -036 -33.20 00 902
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INITIAL CRUISE REPORT, CHAIN 115, LEG 6
by David A. Johnson. 50 pages. June 1974.
National Science Foundation Grant GA-41185.

Leg 6 of CHAIN Cruise 115 began in Rio de Janeiro on 22 April 1974, and terminated in Recife on 18 May 1974. Underway geophysical data, hydrographic observations, and geological sampling programs were carried out. This report summarizes the principal results obtained during this one month expedition.

1. Rio Grande Rise
2. Biostratigraphy
3. Bottom Currents

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